SOIL SURVEY OF GENESEE COUNTY, NEW YORK

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DESCRIPTION OF THE COUNTY

Genesee County is in the northwestern part of New York, about midway between Buffalo and Rochester. Lake Ontario lies about 20 or 25 miles north, and Lake Erie about the same distance west. The county is bounded on the north by Orleans and Monroe Counties, on the east by Monroe and Livingston Counties, on the south by Wyoming County, and on the west by Erie and Niagara Counties. It is roughly rectangular in shape, the east-west dimension being approximately 28 miles and the north-south dimension 18 miles. The total area is 496 square miles, or 317,440 acres.

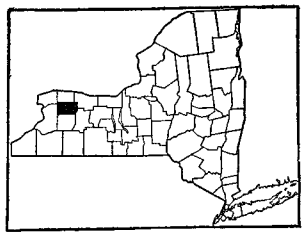

FIG. 48.—Sketch map showing location of Genesee County, New York.

The lowest and smoothest part of the county is a narrow belt extending east and west along the northern boundary. More than half of this belt is so flat that it consists of fresh-water marsh. Its average width in Genesee County is somewhat more than 2 miles.

South of this is an east-west belt of gently rolling country. Its southern boundary, west of Batavia, is followed approximately by the New York Central Railroad. East of Batavia it is followed approximately by the Batavia & Canandaigua branch of the New York Central Railroad. A small part of the third belt projects northward across the railroad in the vicinity of East Pembroke, whereas an area of country essentially like that of the second belt lies south and southeast of Batavia, south of the Batavia & Canandaigua branch of the New York Central Railroad.

A third belt constitutes the southwestern corner of the county, its southern boundary running from the county line about 3 miles east of the southwestern corner of the county to Darien Station on the Lackawanna Railroad, thence eastward, following that railroad to the eastern boundary of the county. It differs from the two belts north of it in having a rougher and more hilly relief.

A northward projection or spur of the plateau of southern New York projects across the county line along all the southern part of the county.

The northern or first belt has an undulating relief, except the flat marsh areas; and in average elevation is a few feet higher than 600 feet above sea level. The second belt is rolling, but the slopes are prevailingly smooth and gentle. The local relief within a distance of a mile is rarely more than 50 feet. A small hilly area lies about 3

miles northeast of Corfu, being rougher and somewhat higher than the rest of the belt. The average elevation is about 800 feet or a little less. The third belt is moderately hilly, especially that part lying west and south of Batavia. The elevation is somewhat higher than that of the second belt, and the slopes are steeper. The relief is much more irregular, and the smooth, rounded slopes characteristic of the relief of the second belt are lacking. The eastern part of the third belt, east of Batavia, has the same or similar type of relief as the second belt, but the elevation is somewhat greater and the local relief a little stronger.

South of the third belt the surface rises more rapidly than north of it, but the slopes are smooth, though relatively steep. The maximum elevation in this part of the county is about 1,460 feet above sea level, this being a point about 2 miles southwest of Linden.

For details of relief see the soil map accompanying this report, which is printed on the sheets of the Topographic Atlas of the United States published by the United States Geological Survey.

All of the drainage waters of Genesee County eventually flow into Lake Ontario. The eastern part drains into the Genesee River through Oatka, Black, and Allen Creeks. The northern part is drained by Oak Orchard Creek into Lake Ontario. The larger part of the county is drained through Tonawanda Creek, which empties into Niagara River. The southwestern part is drained by Murder and Ellicott Creeks and tributaries of Spring Creek.

The first settlement made in this county was near the present site of Le Roy, in 1793. Other settlers came the following years and settled near Le Roy and Stafford and farther north. The village of Oakfield was laid out in 1801, and Batavia in the following year. Most of the early settlers came from eastern New York, Connecticut, Massachusetts, and some from Pennsylvania.

Sawmills and gristmills were erected at an early date, and farming was engaged in from the first. The first railroad connection with the East came with the opening of the Buffalo & Rochester Railroad, which extended from Rochester to Bergen in 1836, and was completed as far as Batavia the following year. The Attica & Buffalo Railroad was opened in 1842. In 1843 rail connection between Buffalo and Rochester was opened. In 1853 the railroads between Buffalo and Albany were consolidated under the name of the New York Central Railroad.

The original boundaries of Genesee County, as laid out in 1802, comprised the larger part of the State lying west of the Genesee River. The present boundaries of the county were established in 1841. The first wagon road to the West through this section was built in 1798. It crossed the Genesee River near Avon, passed through Batavia, and entered Erie County near the Tonawanda Indian village. The first land office was opened by Joseph Ellicott in 1802, and land was sold for $2.75 an acre. Later the Holland Land Co. disposed of the larger part of the land to the early settlers. The first courts were organized in Batavia in 1803.

At present a few square miles in the northwestern part of the county, with some in Niagara and Erie Counties, constitute the Tonawanda Indian Reservation.

Gypsum mines are located at Oakfield, in the northwestern part of the county, and the products are used for making plaster board and

land plaster. The gypsum beds lie from 50 to 60 feet below the surface.

The present population of the county is made up largely of descendants of the early settlers, and many of the farms have been handed down from one generation to another. In some of the larger towns there is a considerable proportion of foreign-born inhabitants.

Batavia is the principal town and county seat, with a population of nearly 15,000. A State school for the blind is located there. Le Roy, in the eastern part of the county, is a manufacturing center and has a population of about 5,000. Oakfield, in the northwestern part, is a thriving village and the center of the gypsum industry. Other towns include Bergen, Byron, and South Byron, in the northeastern part; Elba and Alabama, in the northern and northwestern parts, respectively; Pembroke, Corfu, and East Pembroke, in the western part; Pavilion and Bethany, in the southeastern part; and Alexander and a part of Attica, in the south-central part. Smaller settlements are scattered over the county and serve as trading centers or shipping points for farm products.

The greater part of the rural population is in the northern part of the county or on the central plain. The total population of the county in 1920 was 37,976, of which 53.3 per cent was classed as rural with a density of approximately 40.8 persons per square mile. The population of the county increased from 32,806 in 1880 to 37,976 in 1920, an increase of 5,170 in 40 years. The rural population decreased from 27,961 in 1880 to 20,232 in 1920, a decrease of 7,729 in the same period.

The county is well supplied with transportation lines, no part being more than a few miles from a shipping point. The various railway lines are shown on the soil map. The main traveled roads of the area are being improved or have been macadamized. The other roads of the county are in fair to good condition for the greater part of the year.

Rochester and Buffalo are the nearest large markets. The farm products are disposed of largely through these and local markets in the near-by towns. Some of the special crops are shipped to New York, Chicago, Pittsburgh, and Philadelphia.

Genesee County is considered one of the leading agricultural counties of the State. Farming conditions as a whole are good, and prosperity is indicated by the good condition of the farm buildings and fences and the general appearance of the farms.

CLIMATE

Climatic conditions in Genesee County are somewhat less severe than in the central part of the State, owing to the proximity and tempering influences of Lake Erie and Lake Ontario. The proximity of these large bodies of water tends to delay the occurrence of frost in the fall and to prevent its occurrence late in the spring. This difference in frost occurrence, as compared with the central part of the State, is about two weeks, making Genesee County ideal for fruit crops. Slight variations in temperature occur within the county, owing to differences in elevation; but these variations are comparatively unimportant. The snowfall is a little heavier, and the snow remains on the ground a little longer in the southern part of the county than in the northern part.

The mean annual temperature, as recorded at Elba, in the north-central part of the county, is 45.6° F. The maximum temperature recorded is 100°, in the month of July, and the minimum temperature is −21°, recorded in February. The greatest range in temperature recorded is 121°.

The mean annual precipitation is 36.87 inches. The mean precipitation for the spring and summer months is 9.61 and 9.45 inches, respectively. The mean precipitation for the winter months is 10.31 inches, being largely in the form of snow. The lowest mean seasonal precipitation is for the fall months, which is 7.50 inches. The total precipitation for the driest year on record, 1912, was 30.53 inches; and for the wettest year, 1916, 45.30 inches. The average snowfall for the year is 95.2 inches, 66.7 inches of this being recorded during December, January, and February.

The average date of the last killing frost in the spring is May 8, and that of the first in the fall October 6. The average growing season or frost-free period is 150 days, which is ample time for the maturing of the crops grown in this section. The latest recorded frost in spring occurred at Elba on June 20, and the earliest in the fall on September 14. Snow remains on the ground most of the time from early December to March, and it protects winter wheat from heaving.

The table below, compiled from the records of the Weather Bureau station at Elba, gives the normal monthly, seasonal, and annual temperature and precipitation at this point, these being fairly representative of the general climatic conditions of the county, especially the northern two-thirds.

Normal monthly, seasonal, and annual temperature and precipitation at Elba

[Elevation, 750 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1912)	Total amount for the wettest year (1916)	Snow, average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December	26.4	64	−13	3.21	3.80	3.95	18.7
January	23.4	70	−16	3.70	3.90	2.70	22.8
February	20.0	64	−21	3.40	2.30	5.30	25.2
Winter	23.3	70	−21	10.31	10.00	11.95	66.7
March	31.1	80	−10	3.19	2.20	4.22	14.3
April	43.1	88	10	3.23	2.89	3.74	6.6
May	55.3	93	24	3.19	4.01	6.13	1.1
Spring	43.2	93	−10	9.61	9.10	14.09	22.0
June	63.6	93	33	2.89	.52	6.76	0
July	69.7	100	44	3.66	1.74	2.70	0
August	67.2	95	38	2.90	3.79	2.33	0
Summer	66.8	100	33	9.45	6.05	11.79	0
September	60.9	95	29	2.57	2.00	2.33	Tr.
October	49.6	88	19	2.81	1.89	2.61	.6
November	37.3	75	5	2.12	1.49	2.53	5.9
Fall	49.3	95	5	7.50	5.38	7.47	6.5
Year	45.6	100	−21	36.87	30.53	45.30	95.2

AGRICULTURE

From the time of the first settlement made in the county farming has been the principal industry, though in the last few years there has been considerable increase in manufacturing in some of the towns. Originally all of the lands of the county were forested, and the early settlers began clearing the land and growing crops for subsistence. The Indians occupied this section of the State before the coming of the white man, and were growing crops of corn and fruit. There were large settlements of Indians along the Genesee River east of the county and to the northwest.

The crops grown by the first settlers were largely subsistence crops, such as corn, wheat, potatoes, flax, and vegetables. Gristmills and sawmills were soon built for the grinding of cereals and for sawing lumber. Settlements in this section of the State increased comparatively fast, and there was soon a surplus of farm products, which was hauled to the eastern part of the State. Transportation in the early days was by ox team and was very slow. The Erie Canal was built across the State in 1825, passing about 10 miles north of the county. This was followed by the railroads in 1836, giving further stimulus to farming by opening new markets for farm products. The present transportation facilities of the county are excellent, there being several main rail lines which make the largest markets in the country accessible to this section.

The following data, compiled from the reports of the Census Bureau for 1880 and 1920, show some of the more important changes in the agriculture of the county. In 1880 there were 3,476 farms in the county. The value of all farm property per farm was $6,471, of which 88.2 per cent represented the value of lands and buildings, 3.2 per cent the value of machinery, and 8.6 per cent the value of livestock. In 1920 there were 2,885 farms in the county. The value of all property per farm was $12,109, of which 41.8 per cent represented land value, 34.6 per cent the value of buildings, 8. 6 per cent the value of machinery, and 15 per cent the value of livestock. The average value of land per acre was $52.86. There was a decrease of 591 in the number of farms in this county from 1880 to 1920.

In 1880, 98.2 per cent of the total acreage of the county was in farms, and the average size of the farms was 90 acres, of which 85 per cent, or aproximately 76.5 acres per farm, represented improved land. In 1920, 87.1 per cent of the total acreage was in farms, and the average size of the farms was 95.9 acres, of which 79.3 per cent, or approximately 76 acres per farm, was classed as improved land. The proportion of land in farms decreased somewhat from 1880 to 1920, and the area of improved land per farm has remained about the same. Land values have almost doubled in the same period.

In 1880, 84.3 per cent of the farms were operated by owners and 15.7 per cent by tenants. In 1920, 71.1 per cent of the farms were operated by owners, 27.5 per cent by tenants, and 1.4 per cent by managers.

The acreage and production of the principal crops of Genesee County in 1879, 1889, 1899, 1909, and 1919, compiled from the census reports, are shown in the following table:

Acreage and production of principal crops in Genesee County in 1879, 1889, 1899, 1909, and 1919

Crop	1879		1889		1899		1909		1919	
	Acres	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*
Corn	16,896	712,449	10,981	410,199	12,517	354,080	9,342	388,719	5,974	266,410
Oats	15,582	551,698	20,977	776,562	23,081	820,480	21,048	698,648	15,043	391,746
Wheat	34,387	715,168	32,413	636,753	39,142	786,760	29,930	708,786	35,160	800,511
Barley	15,341	338,992	16,230	447,851	4,169	118,880	2,114	56,997	8,577	167,374
Buckwheat	1,075	18,649	1,142	18,219	1,246	12,430	1,175	21,796	1,555	34,401
Beans		120,129		136,971	12,904	127,538	14,700	234,101	2,419	39,962
Potatoes	7,506	898,632	6,848	572,569	9,663	745,762	9,585	1,217,791	7,990	765,124
Other vegetables					2,033		3,093		2,041	
		Tons		*Tons*		*Tons*		*Tons*		*Tons*
Hay (all kinds)	44,253	47,245	53,196	74,114						
Tame grasses					46,598	52,970	48,747	58,104	63,242	99,160
Timothy							14,441	16,376	16,515	24,215
Timothy and clover							30,107	34,967	39,011	59,124
Clover					2,342	2,951	2,542	2,999	1,761	3,037
Alfalfa					67	138	1,283	3,323	5,080	11,733
Other tame grasses					44,189	49,881	374	439	875	1,051
Wild grasses					111	286	481	469	408	401
Grains cut green					725	1,080	319	505	242	219
Legumes cut for hay									77	144
Silage crops									7,617	68,933
Forage crops					2,724	14,134	4,050	32,986	2,253	2,397
			Trees	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*
Apples			383,258	118,546	381,212	384,957	300,865	581,026	240,604	172,298
Pears			78,606	15,424	85,634	35,420	85,035	36,608	71,149	30,766
					Vines	*Pounds*	*Vines*	*Pounds*	*Vines*	*Pounds*
Grapes					15,748	158,719	8,060	165,429	7,805	72,991
					Acres	*Quarts*	*Acres*	*Quarts*	*Acres*	*Quarts*
Small fruits					88	162,060	80	118,056	50	35,638

The agriculture of Genesee County consists of the growing of wheat, oats, barley, corn, rye, buckwheat, beans, cabbage, potatoes, and hay crops, with some other minor crops, and the production of dairy products.

Wheat has always been the most important crop grown in Genesee County, most of which being winter wheat. Snow remains on the ground during much of the winter and protects the crop from heaving. Wheat is grown on most all the better-drained soils of the county, though the yields are higher on the brown calcareous soils of the northern part. The seed beds are well prepared by deep plowing and harrowing. The principal varieties grown are No. 6 and Gold Coin (No. 6 Jr.), which comprise 90 or 95 per cent of the wheat crop. Another variety of some popularity is Dawson Golden Chaff. Yields on the better soils vary from 20 to 25 bushels per acre.

The acreage devoted to oats ranks second among the cereal crops. This crop is grown on the same kinds of soil as wheat. The principal varieties of oats are New Victory, Swedish Select, Silvermine, and Scottish Chief. Yields varying from 45 to 55 bushels are common on the better soils, though the average for the county is far below these.

Barley is third in importance of the cereal crops, and yields of 25 and 30 bushels are obtained on the better-farmed areas, though the average for the county is below these yields.

The acreage devoted to corn has shown a steady decline during the last 40 years. At the present time the larger part of the crop is cut for silage. The principal corn varieties for silage are Leaming,

Cornell 11, Luce's Favorite, Strawberry Dent, Sweepstakes, and Oil Dent. Yields of silage vary from 8 to 12 tons or more per acre. A part of the corn crop is allowed to mature, and yields varying from 50 to 80 bushels per acre are obtained. The principal varieties of corn grown for grain are Cornell 11, Oil Dent, and other yellow dent varieties. Much fall plowing is done for corn, the seed bed is usually well prepared, and the crop is well cultivated.

Rye has always been a crop of minor importance in Genesee County. From 1879 to 1909 the acreage of this crop was less than 1,000 acres. The census of 1920, however, reports 2,778 acres, yielding 40,188 bushels. The average yields vary from 15 to 20 bushels per acre.

The acreage devoted to beans has decreased during the last decade. Previous census reports, however, show an acreage about equal to corn. Among the principal varieties grown are Michigan Robust, Red Kidney, and Yellow Eye. Yields ranging from 10 to 30 bushels per acre are reported.

The area devoted to buckwheat ranges from 1,000 to 1,500 acres yearly, and yields average about 18 bushels per acre.

Considerable cabbage is grown, and yields vary from 10 to 12 tons per acre. The Danish Ballhead is the principal variety. Spinach is grown for seed in the vicinity of Bergen and Byron with good results. Peas for canning are grown in some parts of the northern section of the county, the Advancer, Admiral, Alaska, and Telephone being the principal varieties. Yields range from 1½ to 2 tons of shelled peas per acre.

The area devoted to potatoes in 1919 was 7,990 acres. The larger part of the commercial potato crop is grown on the calcareous soils, but every farm produces enough for home use. The principal varieties grown on the muck soils are No. 9, Heavyweight, Russet Rural (Dibble's Russet), Champion, Todd's Wonder, and Irish Cobbler. The average acre yield for the county in 1919 was 89.5 bushels, according to the census report, but commercial fields produce from 125 to 200 bushels per acre. In 1922 there were about 1,000 acres of certified seed potatoes grown.

The hay crops are confined largely to timothy, mixed timothy and clover, and alfalfa. The acreage of alfalfa is steadily increasing. The area devoted to hay and forage crops in 1919 was 73,839 acres, or more than for all the cereal crops. Mixed timothy and clover hay yields from 1½ to 2½ tons per acre. Alfalfa yields from 2½ to as much as 4 tons an acre in a season on some of the better lands. This crop is confined almost exclusively to the northern part of the county, on the calcareous soils. Lime is applied in some cases with good results.

Considerable fruit is grown in the county, and most of the farms produce enough for home use. Apples constitute the principal crop, followed by pears, peaches, plums, cherries, and grapes. Apples and pears do well, especially in the southeastern part of the county. Small commercial orchards are located in the vicinity of Bethany, Batavia, Le Roy, Pavilion, and Oakfield. The principal apple varieties are Baldwin, Northern Spy, Golden Russet, and Wealthy. Apples produce from 100 to 150 barrels per acre. Some peaches are grown near Bethany, with fair to good results. Bartlett pears

are grown in commercial quantities, and yield from 200 to 300 bushels per acre. A few Concord grapes are grown, with good yields. Small fruits, such as strawberries, raspberries, and blackberries, are grown in a few localities.

The average small-farm orchard receives very little care, but the commercial orchards are well cared for, cultivated, and sprayed. Fruit diseases and cankerworms are common on the uncared-for orchards. If given proper care the orchards of the county would be productive, as many of the soils are well adapted to fruit growing. According to the census there were 240,604 apple trees of bearing age in the county in 1919, 6,933 peach trees, 71,149 pear trees, 8,664 plum trees, and 8,418 cherry trees.

Considerable truck farming is carried on in the vicinity of Batavia on the developed muck lands and on some of the fine sandy loam soils, which are well adapted to truck crops. Northeast of Elba there is considerable improved muck land on which special truck crops are grown, including onions, lettuce, carrots, some spinach, and celery.

Dairying is an industry of considerable importance in Genesee County. The 1920 census reports 25,462 cattle in the county on January 1 of that year, of which 23,109 were classed as dairy cattle. Over 7,000,000 gallons of milk were produced in 1919, of which about 5,250,000 gallons were sold. The value of dairy products, excluding those for home use, was $1,853,904 in that year. The principal breed of dairy cattle is the Guernsey, with some Holsteins and Jerseys.

According to the 1920 census there were 37,489 sheep in the county and 16,149 hogs. Most all the farms produce sufficient meat to supply home needs.

The agricultural products of Genesee County in 1919, as reported by the 1920 census, were valued as follows: Cereals, $3,140,647; other grains and seeds, $225,587; hay and forage, $2,878,198; vegetables, $2,002,250; fruits and nuts, $408,810; all other crops, $17,980; dairy products, excluding milk and cream for home use, $1,853,904; poultry and eggs, $518,294; and wool, $73,592.

The adaptability of certain soil types to particular crops is given recognition to some extent by the better farmers. The calcareous soils of the northern part of the county are recognized as the best soils for legumes and small grains. Potatoes, beans, and other crops are also well adapted to such soils. Hay crops do well on the heavier-textured soils, and truck crops are grown almost exclusively on the muck and fine sandy loams. The better-drained soils, which contain comparatively high percentages of organic matter and lime, are best suited to more crops than the other soils.

The farming methods as a whole are good. The seed beds are well prepared before the crop is planted, and crops that require subsequent cultivation are well tilled. Most of the manure is plowed under, and the more poorly drained patches in fields are tiled. The farm machinery includes the latest improved implements, and the farm buildings and general appearance of the farms give evidence of prosperity.

The better farmers are realizing the value of crop rotation. A common rotation on the calcareous soils consists of potatoes, beans, or corn, followed by wheat, then by clover for 1 year or by alfalfa

for 3 or 4 years. Another rotation consists of potatoes or corn, followed by oats, then by wheat, and then clover or alfalfa for 3 or 4 years. On the noncalcareous soils the following rotation is practiced: (1) Beans, corn (or potatoes in some cases); (2) oats; (3) wheat; and (4) timothy and clover, mixed, for 2 or 3 years. There is no definite rotation system followed on the bottom-land soils.

The value of organic matter in the soil is recognized, and all manures and some green cover crops are plowed under to increase the soil organic matter. Although most of the soils of the northern two-thirds of the county are considered calcareous soils, they do not all effervesce at the surface, and in places effervescence with acid does not occur within a depth of 30 inches. The surface soils as a whole are not acid, but neutral. The soils of the southern part of the county are usually acid.

The use of commercial fertilizers on the cultivated crops has increased considerably in the last 40 years. The cost of fertilizers purchased in 1879, according to the census, amounted to $50,726, whereas in 1919 the expenditure was $284,735, or an average of $126.10 for the 2,258 farms reporting. Mixtures analyzing 2–8–10 [1] or 1–8–4 are used on most cultivated crops. On muck lands a 2–8–10 mixture is used for potatoes, and a 3–13–3 mixture for lettuce. Applications range from 200 pounds to as much as 1,000 pounds per acre.

The work animals consist almost exclusively of horses. Tractors are becoming common on the more level areas for preparing the land and also for cultivation.

Farm labor is hard to obtain, because of the demands of the manufacturing centers, where labor is better paid. Day wages varied, in 1922, from $1.50 to $2.50; and monthly wages from $35 to $60.

The current value of the better farm lands of the county varies from $100 to $150 an acre. Some of the developed muck lands are held at prices ranging from $400 to $500 an acre. The acreage of tillable land could be considerably increased by drainage.

Genesee County is regarded as one of the best farming counties in the State.

SOILS

The soils of Genesee County have developed under forest cover, except possibly those in some of the more poorly drained areas. The upland soils, developed under the best drainage conditions, are usually brown or light brown, and the subsoils are light brown or range in color from yellowish brown to slightly reddish brown. Where the soils have developed under less favorable drainage conditions, but not marshy or swampy, the topsoils usually vary from grayish brown to gray and the subsoils are mottled gray and yellow to a depth of 3 feet, or the upper part of the subsoil is yellow and the lower part is mottled gray and yellow. Where the soils have developed under swampy or marshy conditions the surface layers are usually dark gray or nearly black and their subsoils are dark grayish brown or nearly black, or mottled throughout.

The soils of the county may be divided into three main groups, based on the color of the surface material: (1) Soils which are

[1] Percentages, respectively, of ammonia (NH_3), phosphoric acid (P_2O_5), and potash (K_2O).

brownish gray or gray; (2) soils which are brown, light brown, or dark brown; and (3) soils which are dark gray or black. The soils of the first group are generally deficient in organic matter. The second group includes soils that have a comparatively high content of organic matter, and constitute some of the best general-farming soils of the county. The third group includes soils composed largely of organic matter which had accumulated under conditions of poor or deficient drainage.

The soils of the county may also be divided into three groups on the basis of the physical character of the subsoil material: (1) Soils having comparatively loose and porous subsoils; (2) soils having subsoils consisting of medium-textured materials which have little or no compactness; and (3) soils having decidedly compact subsoils or hardpans.

Since the presence of lime in the soil is important from the agricultural point of view, another grouping of the soils of Genesee County is suggested. On the basis of the content of carbonate of lime in the parent material, the soils of the county may be divided into three main groups: (1) Soils having subsoils which are highly calcareous at depths varying from 10 to 30 inches; (2) soils which contain medium quantities of lime in their subsoils; and (3) soils which contain little or no lime carbonate in their subsoils.

The loose or unconsolidated mineral material from which the soils of Genesee County have developed had accumulated as the result of more than one geological process. By far the greater part of this parent material is called glacial till, which consists of a mixture of fine-grained and coarse-grained rock materials, such as clay, silt, sand, cobbles, and bowlders, which was carried to the place where it now is by glaciers. This till was deposited when the ice which carried it melted. During the melting streams flowed outward from the ice and deposited material along their courses, and in other cases some soil material was accumulated as the result of the gradual decay of rock. This rock, which varies in character from place to place, underlies all the county, being buried in some places to a depth of many feet by the material which was laid down by the ice or by streams. In other places the country rock is covered by a very thin coating of material which was left by the ice. In the latter case there may have been some disintegration of the rock since the thin covering was laid upon it.

The mantle of material left by the ice or deposited by streams during or after the melting of the ice varies in character, but the main chemical differences pertain to the percentage content of lime carbonate. In some cases there is a large quantity present; in other cases little or none. In the descriptions of the soils which follow the character of the material underlying each kind of soil is stated, the soils, on this basis, being classed into 10 major groups: (1) Soils which have developed from calcareous materials containing considerable silt and clay; (2) soils derived from thin calcareous glacial till and residual materials; (3) soils derived from thin glacial till and residual materials which are largely noncalcareous; (4) soils derived from calcareous, sandy, or gravelly materials; (5) soils underlain by calcareous materials, mainly silty or clayey; (6) soils underlain by noncalcareous, silty, or clayey materials; (7) alluvial

soils which are slightly calcareous; (8) alluvial soils which are not calcareous; (9) soils derived from accumulations of organic matter; and (10) miscellaneous soils.

Under these major groups the different kinds of soils of Genesee County are grouped into series, each series representing a number of soil types which are similar in all respects except in the texture of their topsoils. Descriptions of the various soil series and types follow, first the series in general and then the types in detail and in relation to agriculture:

Soils developed from calcareous materials containing considerable silt and clay.—The soils of Genesee County which have developed from calcareous materials containing considerable silt and clay are grouped into the following series: Honeoye, Ontario, Darien, Lyons, Cazenovia, and Superior.

The soils of the Honeoye series[2] are characterized by topsoils which are brown, dark brown, or slightly grayish brown in color; and by subsoils which are brown, light brown, or slightly reddish brown in the upper parts and grayish brown, brown, or decidedly gray in their lower portions. This grayish subsoil material is partly weathered glacial till which is highly calcareous. The upper subsoils of the soils of this series are slightly more compact than the topsoils or the lower portion of the subsoils. These soils occur on the gently rolling areas in the central and northern parts of the county. Drainage as a whole is good to fair. The Honeoye loam and Honeoye silt loam are mapped in Genesee County.

The soils of the Ontario series are characterized by brown, light-brown, or slightly grayish brown topsoils, and yellowish-brown upper subsoils which are only slightly more compact than the topsoils. The lower subsoils, or substrata, represent partially weathered till which varies from grayish brown to gray in color. This portion of the soil horizon is calcareous. The soils of this series are well drained. They are closely associated with the Honeoye soils, but they have less compact subsoils and do not effervesce so freely

[2] The Ontario series was established in New York many years ago to include the light-colored soils which are derived from glacial drift and which contain a considerable quantity of limestone fragments. This was the definition of the series when the soils of Yates, Monroe, Ontario, Jefferson, Wayne, Oneida, and Oswego Counties were surveyed. In the mapping of Cayuga, Tompkins, and Genesee Counties the soils of this series were more carefully studied than had been possible in the counties just mentioned, mainly because these three counties, extending entirely across the whole region of the State in which glacial drift containing limestone fragments occurs, afforded an opportunity for the comparison and study, within a short period of time, of all the members of the series as they had been previously defined. It was shown by this study that, within the series as previously mapped, there are two rather widely different groups of soils. One of these groups contains those soils that have developed on the smoother areas and in which a compacted subsoil has formed. The smoother country is in the southern part of the general area in which these soils occur and in a region where the glacial drift from which they have been derived contains a higher percentage of limestone fragments than is present in the northern part. This group of soils, therefore, is characterized by a somewhat more compacted subsoil and also by a higher percentage of limestone material than is true of the other group. It became evident, therefore, that these two groups should be separated. The southern group, including the soils which are characterized by the greater percentage of limestone material in the subsoil and the somewhat compacted subsoil, is named the Honeoye series; and the soils of the other group, those having the lower percentage of limestone material and no compaction in the subsoil, and which occur on rolling areas, retain the name of the original series, the Ontario.

The soils in Cayuga and Genesee Counties, therefore, which are now called Honeoye soils, are similar to most of the soils in Monroe, Yates, and Oneida Counties, which were mapped as members of the Ontario series. The soils mapped as members of the Ontario series in Cayuga and Genesee Counties are similar to most of the soils mapped as Ontario in Wayne County, the more rolling Ontario in Ontario County, most of the Ontario and some of the Worth soils mapped in Oswego County, and a small part of the Ontario soils in Jefferson County. The limestone soils on the smooth lands of central New York belong to the Honeoye series, whereas those on the more rolling lands, and those with a relatively small percentage of limestone fragments, belong to the Ontario series.

when tested with acid. These soils occur more generally on the drumlin ridges, areas which have a slightly more rolling topography than those of the Honeoye soils. The Ontario soils are mapped principally in the northern and northeastern parts of the county. The Ontario loam and Ontario fine sandy loam are mapped in this county.

The soils of the Darien series have brown, grayish-brown, and dark grayish-brown topsoils. The upper part of the subsoils is usually mottled gray, yellow, and rust-brown or gray in places, and it is more compact and heavy than the surface soils. The lower portion of the subsoils is gray or drab in color and slightly mottled with yellow. This portion of the subsoil is composed of heavy and compact material, and is underlain by partially weathered glacial till which consists largely of limestone with some dark-colored shale particles. The material at depths ranging from 24 to 30 inches below the surface is calcareous. Surface drainage is good, but underdrainage is somewhat retarded by the heavy, compact subsoil material. The topography of areas of Darien soils varies from undulating to rolling. The Darien silty clay loam and Darien loam are mapped in this county.

The soils of the Lyons series have dark-brown or dark grayish-brown topsoils, and yellow, gray, and brown mottled subsoils which are more compact and heavier than the topsoils. These soils occur in swales or depressions, principally in association with the Ontario and Honeoye soils. Drainage is only fair or poor in most cases, owing to the smooth or gently sloping topography. The Lyons silt loam is the only member of the Lyons series mapped in Genesee County.

The soils of the Cazenovia series have brown or light-brown surface soils which have a slightly reddish cast when viewed from a distance. The subsoils may be slightly reddish brown, slightly pinkish, or light brown in color, and more compact and heavier than the surface soils. The lower portion of the subsoils is less compact and more friable and has a light-brown or grayish-brown color, and contains lime carbonate, as shown by tests with acid. In places the lower subsoil rests upon the underlying limestone rock at depths varying from 30 to 36 inches, and here and there the rock outcrops. Surface drainage is good, but underdrainage is somewhat retarded by the compactness of the subsoil. The topography of areas of Cazenovia soils ranges from smooth to undulating. Cazenovia silt loam, including a shallow phase, is mapped in this county.

The soils of the Superior series have uniformly light-brown, grayish-brown, or brownish-gray topsoils, and subsoils which are mottled gray, yellow, or rust-brown in their upper parts, and more reddish brown deeper down. The upper subsoil material is somewhat heavier and more compact than the surface material. The lower subsoil material is more reddish brown, with a pinkish cast; it is compact, yet friable when bored out, and calcareous. The Superior soils occur on the smooth, gently sloping, and undulating areas to the west and northwest of Oakfield. Surface drainage is only fair in some places, but underdrainage is retarded by the compact, heavy subsoil material. The Superior silt loam and Superior very fine sandy loam are mapped in Genesee County.

Soils derived from thin calcareous glacial till and residual materials.—The residual materials are derived from the underlying limestone and shale rock, being calcareous or slightly calcareous. This major group includes the Mohawk and Farmington series of soils.

The soils of the Mohawk series have dark-brown or dark grayish-brown topsoils, which contain some fine angular shale fragments and rounded till material. The upper subsoil materials are brown, dark brown, or yellowish brown, and contain considerable shale fragments. The lower subsoil materials are brown or dark brown, and more compact than the topsoils. Calcareous till material is scattered through the 3-foot section of these soils, and the soil materials are calcareous. Drainage for the most part is good. Areas of these soils have gently rolling, undulating, and comparatively smooth topography, favorable for intensive cultivation. The Mohawk silty clay loam, with a shaly phase, is mapped in this county.

The soils of the Farmington series have brown, dark-brown, or grayish-brown topsoils which are mellow and friable, and brown, light-brown, yellowish-brown, and in places reddish-brown subsoils with little or no compactness of material. These soils are underlain by limestone at depths ranging from a few inches to 30 inches or more. Drainage is good. The topography of areas of Farmington soils varies from smooth to broken in a few places. The loam, cherty loam, stony loam, and stony silt loam are members of the Farmington series mapped in Genesee County.

Soils derived from thin glacial till and residual materials which are largely noncalcareous.—The soils which have developed from thin glacial till and residual materials, largely noncalcareous, include the soils of the Mahoning, Canfield, Allis, Lordstown, and Trumbull series. The subsoil materials of these soils originated largely from the weathering of the underlying shale rocks, and the glacial till is comparatively thin.

The soils of the Mahoning series have grayish-brown or brownish-gray topsoils, which are underlain by gray, yellow, or brown mottled, compact materials, which in turn are underlain by heavy, compact, and in many places plastic, highly mottled, gray, yellow, or brown layers. Soils of this series may occur on undulating, rolling, and in places broken areas. Surface drainage is good, but underdrainage is poor or deficient. The silt loam is the only member of the Mahoning series mapped in the county.

The soils of the Canfield series may have light-brown, yellowish-brown, or decidedly grayish topsoils. The upper portion of the subsoils may be light brown, yellowish brown, or yellow, with little or no compaction; whereas the lower part is mottled gray, yellow, and rust-brown, and is rather compact in places. Drainage varies from fair to good, though not so good as in the Lordstown soils, owing to the compact nature of the lower subsoil materials. Canfield shaly silt loam is mapped in the county.

The soils of the Allis series have uniformly light-brown or grayish-brown topsoils, which have a decidedly grayish cast when dry, and subsoils, to a depth of 20 or 25 inches, which consist of heavy, compact materials, highly mottled with gray, yellow, and rust-brown. Surface drainage is good, as the land is gently sloping to

rolling. Underdrainage is retarded by the compact, heavy nature of the subsoils. The topsoils represent admixtures of glacial till material with some residual materials. Allis silty clay loam is mapped in Genesee County.

The soils of the Lordstown series have light-brown, grayish-brown, or slightly yellowish brown topsoils, and yellowish-brown or yellow subsoils which consist of materials having little or no compactness. The lower portion of the subsoils represents weathering shale rock, outcrops of which occur in places. These soils are derived largely from residual materials originating from the underlying light-colored shale rock. Drainage is good, as the areas are gently rolling or undulating to comparatively steeply sloping. A shale loam is the only member of the Lordstown series mapped in the county.

The soils of the Trumbull series have dark grayish-brown, grayish-brown, or brownish-gray surface soils. The upper part of the subsoils consists of a compact and heavy material which is mottled with drab, gray, and rust-brown and underlain by a compact and plastic gray or drab material. The soils of this series occur in swales and depressions which have poor drainage. Trumbull silty clay loam is mapped in Genesee County.

Soils derived from calcareous, sandy, or gravelly materials.—The soils which have developed from calcareous, sandy, or gravelly materials include those of the Palmyra and Groton series.

The soils of the Palmyra series have light-brown, brown, or dark-brown topsoils. The upper part of the subsoils is brown or light brown, having a yellowish tinge in some places and a reddish-brown tinge in others. The lower portion of the subsoils is light brown or yellowish brown and slightly more compact than the upper part. The lower subsoils carry large quantities of rounded gravel and stones, and the material is calcareous. The deeper substrata represent stratified beds of gravel and sand. The topography of the areas of Palmyra soils is comparatively smooth, gently sloping, nearly level, or undulating. Drainage is good and the soil material is well oxidized. Palmyra gravelly loam and Palmyra sandy loam are mapped in this county.

The soils of the Groton series have uniformly light-brown or yellowish-brown topsoils, and yellowish-brown or yellow subsoils consisting of loose and porous materials. The lower substrata consist of stratified gravel and sand, materials which were deposited by water at the ice front or under the ice during the glacial period. The topography of areas of Groton soils is rolling. The parent material from which these soils are derived originated largely from limestone, so that the subsoils are calcareous. Drainage is good. The gravelly loam, gravelly clay loam, and very fine sandy loam members of the Groton series are mapped in Genesee County.

Soils underlain by calcareous materials, mainly silty or clayey.—The soils of the county which are underlain by calcareous, silty, or clayey materials are grouped as Dunkirk, Schoharie, and Poygan series.

The soils of the Schoharie series, typical of this group, have grayish-brown or brownish-gray surface soils. The upper part of the subsoils is reddish brown, in places having a decidedly pinkish cast, and the material is heavy and compact. The lower part of the

subsoils is reddish brown, grayish brown, or yellowish brown, and shows some streaks of gray or light-colored lime-carbonate spots. The material constituting the lower portion of the soil profile is calcareous and is compact in place, but more friable when it is bored out. Surface drainage is fair to good, but underdrainage is deficient, owing to the compact, impervious nature of the subsoils. Schoharie silt loam with a heavy phase is mapped in this county.

The soils of the Dunkirk series have light-brown, grayish-brown, or brownish-gray surface soils. The upper part of the subsoils is light brown, yellowish brown, or yellowish in color, the material being rather heavy and compact in the heavier types and loose and friable in the lighter-textured types. The lower subsoil material is light-brown or yellowish-brown material, compact in the heavier-textured types, and consists of stratified beds of sand in the lighter-textured types. The topography of areas of Dunkirk soils is smooth, nearly level, undulating, or gently sloping, being slightly rolling in the sandier areas. Drainage is good to excessive in the sandier areas, but only fair to deficient in the areas of the heavier types. Dunkirk fine sandy loam, together with a sandy phase, and Dunkirk silt loam are mapped in this county.

Soils underlain by noncalcareous, silty, or clayey materials.—This major group includes soils that are similar in origin to those of the preceding major group, though the soil materials have originated largely from shale, sandstone, and crystalline rocks, so that they are noncalcareous. This group includes the soils of the Fulton, Granby, and Tyler series.

The Fulton series includes soils which have dark grayish-brown or grayish-brown topsoils, which have a decidedly grayish cast when dry. The upper portion of the subsoils consists of a plastic, impervious clay, highly mottled with gray, drab, yellow, and rust-brown, the gray and drab colors becoming more pronounced with depth. These soils occur in smooth or nearly level lake plains or depressions, so that the land is poorly drained. Fulton silty clay loam is mapped in Genesee County.

The Granby series includes soils which have dark grayish-brown, dark-gray, or nearly black topsoils. The upper part of the subsoils is mottled gray, yellow, and rust-brown, and the material is slightly more compact and heavier than the surface material. The lower subsoil materials may be gray or mottled gray, yellow, and drab fine sand, silty clay, and clay, in stratified layers. This kind of land is smooth and nearly level, the soils occurring in depressions and swales. Granby silty clay loam and Granby loam are mapped in the county.

The Tyler soils are characterized by dark grayish-brown or brownish-gray colors, the surface material having a decidedly grayish cast when dry. The upper portion of the subsoils is highly mottled with gray, yellow, and rusty brown, and the material is heavier and more compact than the surface layers. The lower subsoil materials occur as heavy, impervious layers of clay, or stratified layers of gray or gray and yellow sands. The topography of areas of Tyler soils is smooth, gently sloping, or slightly undulating. These soils occur on old lake plains or in old lake depressions. Drainage for the most part is poor or deficient. Tyler fine sandy loam and Tyler silt loam are mapped in Genesee County.

Alluvial soils which are slightly calcareous.—The alluvial, slightly calcareous soils of this group represent materials which have been deposited along streams by the action of water. This major group includes the Genesee soils, whose parent materials consist of a mixture of material originating largely from limestone.

The soils of the Genesee series have brown, dark-brown, and occasionally light-brown topsoils, and brown or light-brown subsoils. The subsoil material is little or no heavier than the surface material, and the texture is usually about the same throughout the 3-foot section. The lower subsoil materials are usually slightly calcareous. These soils include the smooth to gently sloping land along stream courses, and they are subject to occasional overflow. Drainage for the most part is good. Genesee silt loam and Genesee fine sandy loam are mapped.

Alluvial soils which are not calcareous.—Alluvial soils which are not calcareous include those of the Tonawanda and Holly series. These soils are also derived from water-laid materials.

The soils of the Tonawanda series have brown or light-brown surface layers. The upper portions of the subsoils are yellowish brown, yellow, or yellow and gray, and mottled; and the lower subsoils materials are yellow, gray, rust-brown, and mottled. The subsoil material is more compact than that of the surface soil. The soils of this series occur at slightly higher elevations above the stream courses than the Holly soils, and they are better drained. These soils are seldom overflowed except during the higher freshets. Tonawanda silt loam is mapped in this county.

The Holly soils have dark grayish-brown, grayish-brown, or gray topsoils, and gray, yellow, and brown mottled subsoils, the gray color becoming more pronounced with depth. The subsoil materials are heavier and more compact than the surface materials. The topography of areas of these soils is smooth, gently sloping, or nearly flat, and as a whole the soils are poorly drained. The soil materials are largely derived from shales and some sandstone, and are non-calcareous. Holly silty clay loam is mapped in Genesee County.

Soils derived from accumulations of organic matter.—The soils of this group represent materials derived from accumulations of vegetable matter, and they are usually dark brown in color. These soils have been mapped as muck.

The material constituting the muck soils consists of dark-colored or nearly black partially decayed vegetable matter, in places being slightly woody. The lower portion has much the same color as the surface material, though the deeper material may be more peaty. Drainage is poor, as the land is level or nearly flat. In places the surface material is underlain at a depth of 20 or 30 inches by gray or white marl, or by gray, blue, or drab-colored fine sand.

Miscellaneous soils.—The group of miscellaneous soils includes lands which are steep or broken and on which outcrops of rock are common, classed as rough broken land. None of this land is regarded as suitable for cultivation.

The various soils mapped in Genesee County are more fully described in the following pages of this report; their distribution is shown on the accompanying soil map; and the following table gives the name, acreage, and proportionate extent of each soil type:

Acreage and proportionate extent of Genesee County soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Honeoye loam	53,888	17.0	Groton gravelly loam	6,720	2.1
Honeoye silt loam	13,888	4.4	Groton gravelly clay loam	1,472	.5
Ontario loam	18,560	5.8	Groton very fine sandy loam	2,624	.8
Ontario fine sandy loam	4,864	1.5	Dunkirk fine sandy loam	11,840	4.4
Darien silty clay loam	22,400	7.0	Sandy phase	2,048	
Darien loam	2,944	.9	Dunkirk silt loam	1,216	.4
Lyons silt loam	11,072	3.5	Schoharie silt loam	2,688	.9
Cazenovia silt loam	10,048	3.3	Heavy phase	320	
Shallow phase	448		Poygan silty clay loam	640	.2
Superior silt loam	13,952	4.4	Fulton silty clay loam	18,944	6.0
Superior very fine sandy loam	2,112	.7	Granby silty clay loam	19,072	6.0
Mohawk silty clay loam	11,968	4.0	Granby loam	1,984	.6
Shaly phase	576		Tyler fine sandy loam	3,456	1.1
Farmington loam	1,472	.5	Tyler silt loam	1,152	.4
Farmington cherty loam	1,600	.5	Genesee silt loam	7,808	2.4
Farmington stony loam	3,712	1.2	Genesee fine sandy loam	512	.2
Farmington stony silt loam	5,120	1.6	Tonawanda silt loam	1,024	.3
Mahoning silt loam	11,584	3.6	Holly silty clay loam	2,880	.9
Canfield shaly silt loam	3,072	1.0	Muck	18,624	5.9
Allis silty clay loam	1,664	.5	Rough broken land	1,088	.3
Lordstown shale loam	384	.1	Quarries	64	.1
Trumbull silty clay loam	5,248	1.6			
Palmyra gravelly loam	8,192	2.6	Total	317,440	
Palmyra sandy loam	2,496	.8			

HONEOYE LOAM

The surface soil of Honeoye loam, from 8 to 12 inches, is a brown or grayish-brown (when dry) mellow loam. The upper subsoil, to a depth of 20 or 25 inches, consists of a brown or slightly reddish brown somewhat more compact and heavy loam or clay loam material. The lower subsoil is a light-brown or grayish-brown compact loamy material, which rests upon a grayish-brown or gray substratum of partially weathered highly calcareous till.

In places there is considerable silty material present, but generally the type is uniformly a mellow loam. Considerable quantities of slightly rounded gravel, and in places larger rocks or bowlders, occur on the surface and in the soil. In a few places the larger stones have been removed to aid cultivation, but generally the gravel and stones do not interfere with cultivation.

Lime carbonate is usually found within 15 or 20 inches of the surface when test is made with acid. The substratum of partially weathered material is usually rather deep, and seldom is there an outcrop of rock. The subsoil material is consistently heavier and more compact than the surface material, though it is crumbly and friable when it is bored or dug out. There is little or no mottling within a depth of 3 feet, though mottling occurs in some variations of the type.

In the vicinity of Le Roy, in the southeastern part of the county, and in the vicinity of Bergen this soil deviates from type. In these places the surface soil is typical, though there is present some fine sand material. The upper subsoil, to a depth of 15 or 20 inches, consists of a compact yet friable loam or clay loam material, slightly mottled with gray, yellow, and brown, and underlain to a depth of 24 or 30 inches by a brown, reddish-brown, or grayish-brown, compact and slightly heavier clay loam or silty clay loam material. Below the subsoil is grayish-brown or gray partially weathered till material which is highly calcareous, particularly at greater depths.

The parent material from which this soil has developed originated largely from limestone, some shale, and igneous rocks. The fact that the parent material is so largely of limestone origin explains the presence of carbonate of lime in the soil. The surface soil rarely shows the presence of lime, though it is seldom acid. No doubt the surface soil originally was calcareous, but the lime carbonate has leached out and none is apparent to a depth of 15 or 20 inches below the surface. The till substratum effervesces freely with acid.

The surface, being mellow and friable, is easily tilled. The subsoil material, although more compact in place, is friable and crumbly when dry. The water-absorbing power of the subsoil material is good, so that crops seldom suffer from lack of moisture. Drainage is fair to good.

This soil type is extensive, occurring in large bodies in the northern and eastern parts of the county; in fact, it is extensive over all of the central plain section of the county. Honeoye loam comprises some of the best farming lands of the county. In general the topography of areas of Honeoye loam is favorable for intensive cultivation.

Originally all of the Honeoye loam was forested with pines and hardwoods; but most of it has been cleared, 85 or 90 per cent being under the plow.

On this type of soil are grown wheat, oats, corn, potatoes, beans, cabbage, rye, barley, timothy, clover, alfalfa, and apples. Wheat yields from 20 to 25 bushels per acre, oats from 60 to 80 bushels, barley from 25 to 35 bushels, rye from 15 to 20 bushels, corn from 60 to 80 bushels, potatoes from 100 to 175 bushels, and beans from 15 to 25 bushels. Hay crops do well, especially the legumes. Alfalfa and clover produce from 3 to 4½ tons of hay, including three or four cuttings. Timothy produces from 1¼ to 1½ tons of hay to the acre, and cabbage from 10 to 12 tons per acre. Some peas are grown for canning, yielding from 1 to 2 tons per acre. The yields of general farm crops on this soil are generally slightly higher than on other soils of the county.

Some dairying is carried on in conjunction with general farming, and gives profitable returns. On this kind of land considerable fruit is grown for home consumption, principally apples and small fruits, including berries.

A crop rotation followed by most farmers on this soil type consists of either potatoes, beans, or corn, followed by wheat, and then by clover 1 year, or by alfalfa for 3 or 4 years. Another crop rotation on land of this type consists of potatoes or corn, followed by oats, then by wheat, and then by clover or alfalfa for 3 or 4 years. The crop rotations followed are much the same on all of the calcareous soils of the county, whereas on the noncalcareous soils different rotations are practiced.

All available manures are plowed under, and the turning under of green cover crops is practiced. Applications of lime are made on some of the legume crops with good results. Some commercial fertilizers are used on cultivated crops, consisting of 2–8–10 or 1–8–4 mixtures.

Considerable fall plowing is done, and the land is usually well worked before crops are planted. Rowed crops are well tilled, and modern farm equipment is used on all farms.

Land of this kind sells at current prices varying from $75 to $150 an acre.

The following table gives the results of mechanical analyses of samples of the surface soil, subsurface material, and the subsoil of Honeoye loam:

Mechanical analyses of Honeoye loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163096	Surface soil, 0 to 8 inches	1.2	7.0	4.8	34.4	11.0	31.0	10.5
163097	Subsurface, 8 to 18 inches	2.0	4.6	3.0	27.7	13.6	31.0	18.1
163098	Subsoil, 18 to 36 inches	2.3	6.0	3.6	29.8	11.2	35.5	11.7

HONEOYE SILT LOAM

The surface layer of Honeoye silt loam, from 8 to 12 inches deep, is a brown, dark-brown, or grayish-brown (when dry) mellow silt loam. The upper subsoil material has a brown, dark-brown, or slightly reddish brown color; in consistence it is more compact and it has a heavier silt loam or silty clay loam texture to depths ranging from 20 to 30 inches. The lower portion of the subsoil consists of a light-brown or grayish-brown compact and heavy material having a loamy or silt loam texture. The deeper substratum consists of partially weathered till having a grayish color. The substratum material is highly calcareous, and the soil material at depths varying from 15 to 20 inches below the surface shows the presence of considerable lime. The parent material from which this soil type has developed is similar to that of the loam type, and the soil occurs in ground-moraine country.

In some places the surface is more nearly a smooth loam. Scattered over the surface and throughout the 3-foot section are considerable quantities of slightly rounded gravel and stones, but these rarely interfere with cultivation. In a few places, especially south of Le Roy and near West Bergen, the upper subsoil shows some mottlings of gray and yellow similar to that in the loam type. This type of soil is rather uniform in texture and color.

Honeoye silt loam occurs in close association with Honeoye loam. Drainage is fair to good. This kind of land has a gently sloping, slightly rolling, or undulating topography, and is well adapted to cultivation.

Honeoye silt loam occurs principally in the northern, northeastern, and southeastern parts of the county, the largest areas lying north and northeast of Batavia.

This soil constitutes some of the best general-farming land of the county. (Pl. XLII.) The cropping system and yields produced are similar to those of the loam type.

Honeoye silt loam is prized highly for general farming, and it commands a good price.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Honeoye silt loam:

Mechanical analyses of Honeoye silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163025	Surface soil, 0 to 10 inches	1.2	2.6	2.0	12.9	28.6	36.3	16.5
163026	Subsurface, 10 to 20 inches	.6	2.4	2.6	16.4	29.0	35.2	13.8
163027	Subsoil, 20 to 36 inches	1.4	2.6	2.4	15.6	19.7	29.5	28.9

ONTARIO LOAM

The surface soil of Ontario loam, to a depth of 6 or 10 inches, is a brown or dark-brown mellow loam, in places having a reddish-brown cast, and in other places it is rather lighter brown. In general the surface appearance, when dry, is a grayish brown. The upper part of the subsoil, to depths varying from 15 to 25 inches, is composed of material which has a yellowish-brown or slightly reddish brown color. It is slightly more compact, in texture it varies from loam to silt loam, and it is friable and has a crumb structure. This subsoil material in the Ontario soils is less compact and more friable than that in the Honeoye soils. The lower subsoil material, to depths ranging from 30 to 36 inches, is yellowish brown or grayish brown in color, and in some places it has a reddish-brown cast. This material is slightly compact and loamy, being friable and crumbly when it is dug or bored out. The parent material is grayish-brown or decidedly grayish partially weathered calcareous glacial till. Effervescence with acid begins at depths varying from 15 to 25 inches below the surface, though as a whole the soil does not effervesce so freely with acid nor does it react with acid so near the surface as in case of Honeoye soils.

The parent material from which the soil is derived is largely from limestone, and to a lesser extent from sandstone, shale, and crystalline rocks. The depth to consolidated rock is generally many times the thickness of the soil.

Ontario loam is comparatively uniform in color and texture throughout the county, though in some spots there is a slight mottling of gray, yellow, and brown in the upper subsoil. Scattered over the surface and throughout the soil are considerable quantities of rounded stones and gravel, and in some places rather large bowlders occur; but as a whole the gravel and stone content does not interfere with cultivation.

This type of soil occurs largely in the northern and northeastern parts of the county and is the predominating soil occurring on low, rounded ridges or hills, and the land surface is favorable for intensive farming.

Both surface drainage and underdrainage are good, as the slopes allow fairly rapid run-off, and the friable subsoil allows rain water to percolate freely through it.

FIG. 1.—WINTER WHEAT ON HONEOYE SILT LOAM

FIG. 2.—CABBAGE ON HONEOYE SILT LOAM

FIG. 1.—BEANS ON FARMINGTON CHERTY LOAM

The light color between the bean rows is due to the light color of the small fragments of chert

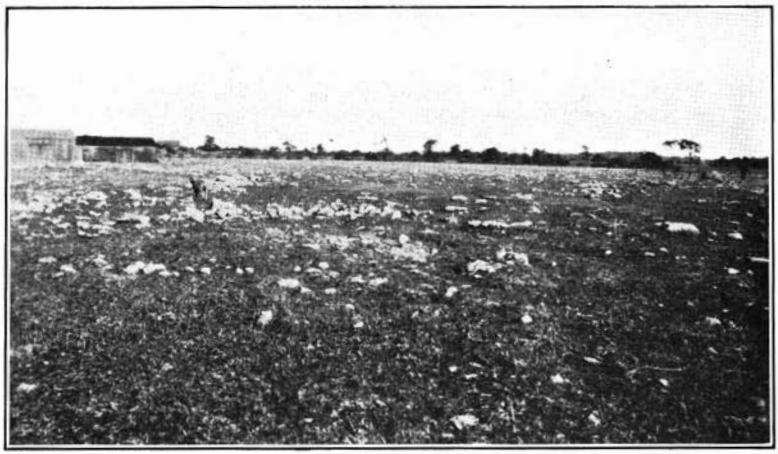

FIG. 2.—TOPOGRAPHY OF FARMINGTON STONY LOAM

Originally all of this type of soil was forested, but at present 90 or 95 per cent of it is cropped, growing principally wheat and oats, and alfalfa, clover, timothy, beans, cabbage, potatoes, and corn. Fruit and berry crops are also grown, but principally for home consumption. Yields are good and compare favorably with the yields obtained on the Honeoye soils.

The soil is well prepared for planting and it is well tilled. Farming conditions on Ontario loam are good and the farms show prosperity. The current value of land of this type ranges from $75 to $150 an acre.

The small areas of Ontario loam which occur on steeper slopes and more rolling portions of ridges are not well adapted to farming. Such areas would have been mapped as a steep phase if they were of greater extent. These areas occur as small and narrow strips in a few places in the northern and northeastern parts of the county, and as a few small areas southeast of Batavia. On these steep areas the soil material is similar in color and texture to the typical Ontario loam, the principal difference being a more shallow surface soil, from 3 to 5 inches deep. Erosion has been more active in such areas, having removed some of the surface soil. Only a small part of these steep slopes is under cultivation, the larger part being used for pasture, and in places for fruit growing. Some hay is grown, with fair to good results.

ONTARIO FINE SANDY LOAM

The surface soil of Ontario fine sandy loam, from 8 to 12 inches deep, is brown, dark brown, or grayish brown when dry. The surface, as well as the soil itself, is practically free from stones or gravel. The upper subsoil material, to a depth of 18 or 20 inches, is light brown, yellowish brown, and in places slightly mottled with gray, and it is friable and only slightly more compact than the surface material. The lower subsoil, to a depth of 25 or 30 inches, consists of a slightly more compact and heavier material, brown, light brown, or slightly reddish brown in color, and having a gritty clay loam texture. Below a depth of 3 feet the material has a grayish-brown, brownish-gray, or gray color; it is rather loamy and highly calcareous, this being partially weathered glacial till.

Ontario fine sandy loam is not so extensive as Ontario loam. As mapped in Genesee County it occurs as comparatively small areas in association with Ontario loam, principally near Byron, Elba, and north and west of Oakfield.

The surface relief of this land is gently sloping, undulating, or slightly rolling. In some places this soil occurs on the crests of the drumlin hills, and in other places on the more gentle slopes. The topography is favorable for intensive cultivation. Both surface and internal drainage are good in all the areas.

The larger portion of Ontario fine sandy loam has been cleared and is used for the production of general farm crops, consisting of small grains, hay, beans, cabbage, corn, and fruit. Crop yields are good, being similar to those on the Ontario loam. The soil is easily tilled and the seed beds are well prepared before planting.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Ontario fine sandy loam:

Mechanical analyses of Ontario fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163083	Surface soil, 0 to 10 inches	2.0	5.0	4.0	24.2	21.0	31.8	12.1
163084	Subsurface, 10 to 18 inches	1.4	5.4	4.2	29.9	20.6	29.7	8.9
163085	Subsoil, 18 to 30 inches	1.4	4.6	3.4	29.4	16.0	24.9	20.2
163086	Subsoil, 30 to 36 inches	2.2	5.4	3.8	31.4	15.0	26.6	15.6

DARIEN SILTY CLAY LOAM

The surface soil of Darien silty clay loam, to a depth of 6 or 10 inches, is a brown, dark grayish-brown, or grayish-brown heavy silt loam or silty clay loam, having a pronounced grayish cast in dry cultivated fields. Some stones and gravel are scattered over the surface and throughout the soil, but not in sufficient quantities to interfere with cultivation. The upper subsoil, to a depth of 15 or 18 inches, consists of a compact material mottled with yellow, gray, and rust-brown, and having a heavy silty clay loam or silty clay texture. The lower subsoil material is similar in texture, gray or drab in color, and compact but crumbly. This material represents partially weathered glacial till which consists of a mixture of limestone and fragments of dark or nearly black shale. This material effervesces freely when treated with acid, and the lower subsoil material shows the presence of lime.

Although the surface soil is consistently heavy textured, there are patches where the soil more nearly approaches a loam and is more friable and loose. Such areas are small and they are included in mapped areas of silty clay loam. Limestone and fragments of black shale are common in this soil.

Darien silty clay loam is derived from a mixed material consisting of glacial till, largely of limestone, and fragments of nearly black shale. The shale material has not been transported so far by the action of ice as the other materials. In places the underlying shale comes near the surface or outcrops. The parent material is calcareous. The Darien soils represent an intermediate stage of soil development between the Honeoye soils, which are derived largely from limestone till, and the Mohawk soils, which are derived largely from dark-colored shales.

The topography of areas of Darien silty clay loam varies from gently sloping and undulating to rolling and broken, though in general the topography favors cultivation.

Darien silty clay loam occurs extensively in the southern part of the county. It includes the lower slopes of the hill section, between the ground-moraine country to the north and the higher part of the true hill section. It is confined largely to Darien, Alexander,

Bethany, and Pavilion Towns, in the southern part of the county, and a little occurs in Batavia and Pembroke Towns.[3]

Surface drainage is good to excessive on some of the steeper slopes, but underdrainage is retarded by the compact and heavy subsoils. For the most part this kind of land is well drained, though there are some patches that would be benefited by tile drainage.

Originally all of this soil was forested, but at present 75 or 85 per cent of it is cleared and is used for growing general farm crops. This soil is very productive. Yields of wheat, oats, rye, corn, alfalfa, clover and timothy hay, beans, cabbage, and potatoes compare favorably with those obtained on the Honeoye soils. Legumes do well, yielding from 2 to 3 tons per acre.

In the vicinity of Bethany there are several commercial orchards located on this type of soil, principally of apples. Some peaches, pears, and grapes are also grown in this vicinity. Apples yield from 100 to 150 barrels and pears yield about 300 bushels per acre. Some Concord grapes are successfully grown. Peaches also do well. Fruits are grown in other localities on this soil type, but principally for home consumption.

The Darien silty clay loam is low in organic matter, and the practice of turning under green cover crops and farmyard manure should be more generally followed.

The soil tends to bake and clod when it is plowed too wet. Fall plowing is generally practiced on this type of soil. Light applications of lime are made for legumes and prove very beneficial.

Mapped areas of Darien silty clay loam include some small patches in which the surface soil is only 3 or 6 inches deep, owing to surface erosion. In other patches the subsoil material is not so highly mottled and it is not so compact and heavy as the typical soil, owing to better drainage conditions. On other patches, including the steeper slopes, the subsoil material is brown or light brown and slightly compact, representing partially weathered glacial till. The pronounced mottled condition of the typical soil is only slightly developed or entirely missing in many of these areas. In still other patches the soil is similar to the Honeoye soils.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Darien silty clay loam:

Mechanical analyses of Darien silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163028	Surface soil, 0 to 9 inches	1.0	2.4	2.0	10.8	13.2	43.0	27.6
163029	Subsurface, 9 to 15 inches	.8	2.6	1.8	11.0	11.0	41.2	31.6
163030	Subsoil, 15 to 28 inches	.0	.6	.6	4.4	6.0	44.2	44.3
163031	Subsoil, 28 to 36 inches	.2	.6	.4	7.2	4.8	43.4	43.2

[3] The term "town" in New York is synonymous with township.

DARIEN LOAM

The surface soil of Darien loam, from 6 to 9 inches deep, is a light-brown, brown, or grayish-brown loam containing varying quantities of fine sand and silt. In places the texture of the surface material approaches a silt loam. Scattered over the surface and throughout the soil are slightly rounded stones and gravel, principally of limestone origin. Some of the stones are fragments of shale, nearly black in color, and other stones in places are large igneous bowlders and other crystalline rocks. In dry cultivated fields the surface soil has a grayish or dark grayish-brown cast. The subsoil, to a depth of 15 to 18 inches, consists of a compact silt loam or loamy material mottled with gray, yellow, and rust-brown, though it is friable and crumbly when it is bored or dug out. Small fragments of black shale are common in the subsoil. The lower subsoil material to a depth of 25 or 30 inches consists of a compact silty clay loam or silty clay material, which contains some gritty material and fragments of black shale. Its color may be a grayish brown, gray, or drab, with some mottlings of yellow. The lower subsoil, to a depth of more than 3 feet, consists of a grayish-brown, brownish-gray, or gray and drab fairly compact but friable silty clay loam or heavy loamy material, which effervesces freely with acid, showing the presence of lime. This lower portion of the subsoil is partially weathered glacial till, largely of limestone and shale origin. The soil material effervesces with acid at depths varying from 18 to 24 inches below the surface.

In a few places the underlying shale comes within 3 feet of the surface, and it outcrops here and there. Where the shale comes within 3 feet of the surface some effect from this rock is noticeable, and at a depth of about 3 feet the material resembles the substratum of the Mahoning soils. Such areas, being small, are included with mapped areas of Darien loam.

The topography of this kind of land varies from gently sloping and undulating to slightly rolling, in places the slopes being comparatively steep. In most places the topography is favorable for intensive cultivation. This soil is not so extensive as Darien silty clay loam. It occurs in the south-central part of the county, along the Wyoming County line, in the vicinity of Linden, and south of Bethany. The soil occurs in some of the higher areas of the hill section, where the glacial till is comparatively deep. The parent material from which the soil is derived consists principally of a mixture of limestone and fragments of black shale, representing ground moraine.

Surface drainage is good to excessive on the steeper slopes, but internal drainage is somewhat retarded by the compact subsoil material.

About 80 or 90 per cent of this soil is used for farming, including pasture. General farm crops are grown, including corn, wheat, oats, rye, timothy, clover, alfalfa, potatoes, cabbage, and beans. Yields compare favorably with those obtained on Darien silty clay loam, but are slightly lower than those obtained on the Honeoye and Ontario soils. A few small orchards, principally of apples, are established on this soil type, which produce good yields.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Darien loam:

Mechanical analyses of Darien loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163010	Surface soil, 0 to 7 inches	1.6	2.0	1.6	12.4	14.6	48.4	19.2
163011	Subsurface, 7 to 15 inches	1.4	3.4	2.4	19.2	9.0	45.6	19.0
163012	Subsoil, 15 to 30 inches	1.6	3.2	1.9	19.1	5.8	40.5	27.9
163013	Subsoil, 30 to 36 inches	1.4	3.4	2.2	19.2	11.6	40.4	21.8

LYONS SILT LOAM

The surface soil of Lyons silt loam, from 6 to 10 inches deep, is a dark grayish-brown or grayish-brown silt loam or heavy silt loam where typically developed. The soil is generally free from stones and gravel. The upper subsoil, to a depth of 20 or 25 inches, consists of a heavy, compact silt loam or silty clay loam material, mottled with gray, yellow, and rust-brown. The lower portion of the subsoil, to a depth of 30 or 36 inches, consists of a grayish-brown, brownish-gray, or gray clay loam material, which is more gritty, compact, and heavy, yet more friable, than the upper subsoil material. Below a depth of about 3 feet the material represents partially weathered calcareous glacial till, originating largely from limestone.

The surface and upper subsoil materials of this soil type are comparatively uniform in color and texture. In some places the surface soil is light brown or brownish gray when dry. In places the lower subsoil material varies. It has a decidedly pinkish cast and consists of heavy clay or silty clay. In the virgin condition of some of the land the surface soil is dark brown or nearly black, there being an abundance of vegetable matter in the soil.

Lyons silt loam occurs on smooth, plainlike areas, or more generally in swales or depressions, in association with the Honeoye and Ontario soils, in the central plain section of the county. Much of the land is smooth or nearly level, and it has poor to deficient drainage in the virgin state. Underdrainage is poor, owing to the compact, heavy subsoil material. When properly drained by ditches or tile the soil is productive.

In its natural state this soil supported a growth of hardwoods. The larger part of this land is forested or is used for pasture, and approximately 35 or 40 per cent of it is used in growing general farm crops. The principal crop is hay, consisting of timothy, clover, and some alfalfa. Wheat, oats, beans, and corn are grown with fair or good results on the better-drained portions. The yields are not so high as on the associated Honeoye and Ontario soils.

This type of soil occurs as narrow strips or small tracts of poorly drained land in association with the calcareous soils of the northern part of the county. It is generally sold in connection with the associated soils, and is used for pasture.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Lyons silt loam:

Mechanical analyses of Lyons silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163080	Surface soil, 0 to 7 inches	1.2	2.4	1.8	11.0	17.8	44.7	21.2
163081	Subsurface, 7 to 22 inches	1.0	3.0	2.0	13.8	16.8	37.9	25.4
163082	Subsoil, 22 to 36 inches	.4	2.8	1.9	14.6	17.4	43.4	19.6

CAZENOVIA SILT LOAM

The surface soil of Cazenovia silt loam, about 6 or 8 inches deep, is light brown or brown in color, having a slightly reddish brown cast in cultivated fields. When dry the surface soil has more of a grayish-brown or brownish-gray color. The texture is smooth silt loam, with little or no gritty material. The subsoil, to depths varying from 24 to 30 inches, is a reddish-brown or slightly pinkish, heavy and compact, silty clay loam material. When dry the subsoil material is crummy or granular in structure. Deeper down the material may be reddish brown, grayish brown, or brownish gray in color, rather friable, and having a silty clay loam texture. It contains some partially weathered glacial till which originated from limestone, sandstone, and from some shale and crystalline rocks. The lower subsoil material is calcareous. In a few places the true subsoil extends to a depth of more than 3 feet, the more friable and highly calcareous layer lying below this level. In other places the underlying limestone outcrops or comes near the surface, though such spots are not common and are of small extent.

Immediately below the surface layer, on some of the more poorly drained areas, there is a thin layer of gray or slightly mottled gray and yellow silty clay loam material. This variation occurs only on the flatter and less extensive areas. Although the substratum is usually partially weathered glacial till, the underlying limestone is not far below, usually at a depth of more than 3 feet below the surface. The soil is free from any stones or gravel that would interfere with cultivation. In a few patches the texture of the soil is more like a loam, but such patches are included in areas mapped as silt loam.

The parent material is glacial till which originated mainly from limestone. The till material has weathered to a depth of 25 or more inches in most places. The lower subsoil and parent material is calcareous. The reddish tinge of the subsoil owes its origin to red sandstone and shale.

Cazenovia silt loam occurs principally around and near Oakfield, in the northern part of the county, and near Elba, also in the northern part. Together with its shallow phase, the total extent of this soil in the county is 16.4 square miles.

The topography of this land is gently sloping, gently rolling, or undulating, favorable for intensive farming. As a whole the land is well drained, better than the Superior soils, but not so well drained

as the Honeoye and Ontario soils. There are a few small tracts that would be helped by artificial drainage. Underdrainage is retarded to some extent by the compact subsoil.

About 80 or 90 per cent of this land is under cultivation. Crop yields are good, though slightly lower than on the Honeoye and Ontario soils. Among the common crops are wheat, oats, rye, corn, cabbage, potatoes, beans, and peas for canning. Wheat yields from 15 to 22 bushels per acre, oats from 60 to 70 bushels, corn from 50 to 60 bushels, potatoes from 75 to 100 bushels, cabbage from 8 to 10 tons, beans from 15 to 20 bushels, and alfalfa from 2½ to 3 tons per acre. Legumes do well and produce yields equal to those on the Honeoye soils. Peas for canning yield from 1 to 1½ tons per acre.

This soil is easily tilled, though it tends to bake when dry and clod if it is plowed too wet. Similar crop rotations are practiced on this soil type as on the Honeoye soils. All available manures and stubble and some green cover crops are plowed under. Light applications of commercial fertilizer, usually a 2–8–10 mixture, are given to cultivated crops.

This kind of soil is considered one of the better soils of the county. Most of the farmers on this land are prosperous, as evidenced by the general appearance of the farms. The current value of this land ranges from $60 to $150 an acre.

Cazenovia silt loam, shallow phase.—The surface soil of the shallow phase of Cazenovia silt loam is very similar to the typical soil, though the reddish cast is not so pronounced. The color ranges from light brown to grayish brown, and the subsoil material is similar to that of the typical soil.

At a depth of 24 or 30 inches this soil is underlain by gray, thin-bedded limestone and calcareous shales. In places the underlying rocks come within a few inches of the surface, though generally they occur at a depth of 24 inches or more. Mottlings in the upper subsoil are common. The soil material represents a comparatively thin mantle of glacial till which overlies the country rock.

This soil occurs mainly northwest of Oakfield, in the vicinity of the United States Gypsum Co. plant. It comprises only a comparatively small acreage. The land is smooth and gently sloping or slightly undulating. About 95 per cent or more of this soil is used for growing the same crops as are grown on the typical soil, and yields of grain, potatoes, and beans are about the same, but yields of other crops are slightly lower.

Most of this shallow-soil land is owned by the United States Gypsum Co., and gypsum is mined on some of it.

The results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of typical Cazenovia silt loam are shown in the following table:

Mechanical analyses of Cazenovia silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163067	Surface soil, 0 to 8 inches	1.2	2.9	2.0	13.0	19.8	44.8	16.4
163068	Subsurface, 8 to 30 inches	.8	2.0	1.4	7.0	13.7	43.4	31.7
163069	Subsoil, 30 to 36 inches	1.3	2.4	1.7	11.3	17.4	40.7	25.0

SUPERIOR SILT LOAM

The surface soil of Superior silt loam, from 6 to 10 inches deep, is a grayish-brown or brownish-gray (when dry) smooth silt loam which contains little or no gritty material. The upper subsoil, to a depth of 15 or 18 inches, consists of a compact heavy silty clay loam material, mottled with gray, yellow, and rust-brown. The lower portion of the subsoil, to a depth of 25 or 30 inches, consists of a reddish-brown or pinkish compact silty clay. Deeper down, to a depth of 3 or more feet, the material has a pinkish, grayish-brown, or gray color, a silty clay loam texture, and is somewhat compact, though it is friable when it is bored out. This material at a depth of 3 feet represents partially weathered glacial till which was derived largely from limestone and is highly calcareous.

In places the material comprising the lower subsoil appears to be water-laid, it is rather pinkish in color, and it is a compact clay. Generally the soil material is calcareous below depths ranging from 20 to 25 inches. The surface soil and the subsoil, except in the lower part, are generally free from stones and gravel.

Superior silt loam is rather extensive in the county, occurring principally in the vicinity of Oakfield, Alabama, Alabama Station, Pembroke Station, and near Corfu, in the southwestern part. It is confined largely to the northwestern and west-central parts of the county.

This land is generally rather smooth, gently sloping, or undulating. Some slight depressions or swales occur in places, and in other places the surface is nearly level, as on areas which represent broad and smooth lake plains. Drainage is fair to good, though rather slow, owing to the smooth, gently sloping topography. Much of the land would be helped by artificial drainage. Considerable areas are tile drained. Underdrainage is deficient, owing largely to compact and heavy subsoil materials.

About 85 or 90 per cent of the land has been cleared, and grows the ordinary farm crops. Pasture lands are good as a rule, and hay yields from 1½ to 2 tons per acre. Wheat, oats, and rye are grown with fair to good results on the better-drained areas of this land. Corn does well, and some potatoes are grown on the higher, better-drained areas. Some beans are also grown, producing fair yields. Generally Superior silt loam is deficient in organic matter, and for improvement manures and green-manure crops should be plowed under.

SUPERIOR VERY FINE SANDY LOAM

The topsoil of Superior very fine sandy loam, from 5 to 8 inches deep, is a light-brown or grayish-brown very fine sandy loam. In places the texture is more nearly like a fine sandy loam. The grayish cast of the surface soil is very noticeable in dry cultivated fields. Both topsoil and subsoil are practically free from gravel and stones. The upper subsoil, to a depth of 15 or 18 inches, is generally mottled with gray, yellow, and rust-brown, though in places the material has a decidedly gray color, and in other places it is yellow or pale yellow. The material at this depth is slightly more compact and heavier than the surface material, though in places the material has

a fine sandy loam texture and contains considerable silt. The lower subsoil, to depths varying from 25 to 30 or more inches, is a heavy, reddish-brown, or somewhat pinkish colored gritty clay loam material. At a depth of about 3 feet it is reddish brown or pinkish in color, gritty clay loam or silty clay loam in texture, compact and heavy, though friable when it is bored out. This deeper material is partially weathered glacial till originating largely from limestone and from red sandstone. According to the acid test it is calcareous.

Superior very fine sandy loam occurs in close association with Superior silt loam and Dunkirk fine sandy loam, and it is mapped principally north of East Pembroke, northwest of Batavia, and in small areas in the northwestern part of the county. This type of soil is not extensive in this county, aggregating only a few square miles.

The topography of areas of Superior very fine sandy loam ranges from gently sloping and gently rolling to undulating, and land drainage is fair to good.

About 80 or 85 per cent of the land produces hay, small grains, potatoes, cabbage, beans, and corn. Yields are fair to good, comparing favorably with the yields obtained on Superior silt loam. This land is easily tilled, and it is well adapted to potatoes and truck crops.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Superior very fine sandy loam:

Mechanical analyses of Superior very fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
1630111	Surface soil, 0 to 7 inches	0.6	2.8	3.6	46.0	14.0	23.9	9.1
1630112	Subsurface, 7 to 15 inches	.3	5.0	6.8	48.0	8.7	23.2	8.0
1630113	Subsoil, 15 to 30 inches	.6	1.4	1.2	25.8	14.8	32.0	24.2
1630114	Subsoil, 30 to 36 inches	.6	1 6	1.4	26.2	18.7	34.5	17.0

MOHAWK SILTY CLAY LOAM

The topsoil of Mohawk silty clay loam, from 8 to 12 inches deep, is a brown, dark-brown, or dark grayish-brown heavy silt loam or silty clay loam which contains some rounded gravel and stones and small angular fragments of shale. The surface soil pulverizes easily and is easily tilled. The subsoil, to a depth of 25 or 30 inches, consists of a brown, dark-brown, or in places slightly yellowish brown material which is slightly more compact and somewhat heavier in texture than the surface material, though it is friable and crumbly when it is bored out. This material contains a considerable quantity of angular fragments of shale. The lower subsoil, to a depth of more than 3 feet, consists of a slightly compact, friable, silty clay loam material, which is light brown, brown, or even dark brown in color, and which contains a greater quantity of the shale fragments. This deeper material is derived in large part from the underlying slightly calcareous black shale.

Stones are scattered over the surface and mixed with the soil—limestone, sandstone, shale, and some igneous rocks, the black shale and limestone materials predominating. The material occurring at a depth of 3 feet is calcareous.

This soil does not have a compact subsoil, as in case of the Darien soils. The structure of the subsoil material is similar to that of the Honeoye soils. The topsoil owes its dark color to the nearly black shale from which the soil material is largely derived.

Mohawk silty clay loam is rather extensive in the county, the largest areas lying southwest of Batavia, near Corfu, and in the vicinity of Darien, Lehigh, and Darien Center, in the southwestern part of the county.

The topography of areas of this type of soil is gently rolling, comparatively smooth, or gently undulating, and all of the land is suitable for intensive farming. Drainage is generally good, but there are a few small depressions or swales where the run-off is rather slow.

About 75 or 80 per cent of this land has been cleared, and is used for growing wheat, oats, rye, timothy, clover, alfalfa, corn, potatoes, beans, and cabbage. The yields of all these crops are good, comparing favorably with those obtained on the Honeoye and Ontario soils.

This soil is easily tilled, and it is fairly well supplied with organic matter. Light applications of lime are beneficial for leguminous crops.

Mohawk silty clay loam, shaly phase.—The surface soil of the shaly phase of Mohawk silty clay loam is similar in texture and color to that of the typical soil, the main difference being the presence of an abundance of small, angular, nearly black fragments of shale on the surface and in the soil.

The shaly phase of Mohawk silty clay loam is not extensive in the county, aggregating only 576 acres in the vicinity of Darien Center, in the southwestern part of the county. The parent material of this soil has originated largely from the dark-colored shale, and it contains a small quantity of glacial till. The shale is slightly calcareous.

The shale fragments on the surface and in the soil do not interfere with cultivation, and practically all of this land is farmed.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of typical Mohawk silty clay loam:

Mechanical analyses of Mohawk silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163038	Surface soil, 0 to 12 inches	2.0	2.6	1.6	9.9	5.6	47.1	31.1
163039	Subsurface, 12 to 30 inches	.6	2.6	1.6	9.8	4.5	47.4	33.6
163040	Subsoil, 30 to 36 inches	2.2	3.8	1.7	9.4	3.0	49.0	30.9

FARMINGTON LOAM

The surface soil of Farmington loam, to a depth of 4 or 6 inches, is a brown or dark-brown loam with considerable cherty gravel and some stones occurring on the surface and in the soil. The surface material when dry has a grayish-brown cast in cultivated fields. The subsoil, to depths varying from 15 to 24 inches, may consist of brown, light-brown, reddish-brown, or slightly yellowish brown material, rather compact, but friable and crumbly when bored out. The underlying limestone is usually encountered at depths ranging from 15 to 24 inches below the surface, and in places it outcrops or occurs only a few inches below the surface. Some glacial till is mixed with the limestone and cherty material, though most of the stones and gravel come from local country rocks. The finer soil material consists of glacial till derived from shale and crystalline rocks.

The topography is gently sloping or gently rolling to undulating and favorable for cultivation. Drainage is fair to good, though during the dry seasons the soil is inclined to be droughty on account of its shallow depth to rock.

This type of soil occurs principally northwest of Batavia, with a few small areas elsewhere in the northwestern part of the county. It is not an extensive soil in Genesee County.

Practically all of this land has been cleared and is used for cropping, some being in pasture. Small grains, corn, alfalfa, clover and timothy, beans, potatoes, and cabbage are grown. The yields of all crops compare favorably with those obtained on the Honeoye soils, though perhaps they are slightly lighter.

Included in mapped areas of Farmington loam are patches of mellow and smooth silt loam about 10 or 12 inches deep, having a brown or grayish-brown color. The subsoil, to depths varying from 20 to 30 inches, varies from yellowish-brown to mottled yellow, gray, and brown material, friable or compact, and having a heavy silt loam texture. The underlying limestone rock in these included areas usually occurs at a depth of about 20 or 30 inches below the surface, and in some places it comes to the surface or lies within a few inches of it. The parent material is a mixture of Genesee and Tonawanda soil materials. Such soil would have been mapped as a phase of the Genesee silt loam if it were of greater extent. An area of this soil occurs on a terrace above Allen Creek in the vicinity of Fort Hill. Little or none of this land is subject to overflow, as it lies from 4 to 20 feet above the stream. In some places the lower subsoil is composed in part of residual material from the underlying limestone and resembles that of the Farmington soils.

FARMINGTON CHERTY LOAM

The surface soil of Farmington cherty loam, to a depth of 5 or 7 inches, is a grayish-brown or brownish-gray (when dry) cherty loam, which contains an abundance of small, sharp, and angular fragments of chert, the fine cherty material predominating. The subsoil, to depths varying from 12 to 18 inches, consists of a light-brown, slightly reddish brown, or yellowish-brown cherty loam material, underlain by a mass of chert or cherty limestone. The cherty lime-

stone generally occurs at shallow depths, and in places it comes to the surface. The abundance of chert on the surface and the small proportion of finer soil material are the distinguishing characteristics of this type of soil.

Material composing this soil originated almost exclusively from the underlying cherty limestone. Locally this soil is called "flint" or "chawed-rock" soil. It occurs principally in the vicinity of Indian Falls and near the Helderberg escarpment, in the northwestern part of the county. A few patches of this soil are included in areas of the stony loam and stony silt loam of the Farmington series, on account of their small extent.

Areas of this soil are smooth and gently sloping to undulating, and its drainage is good. Under average moisture conditions crops do not suffer for lack of moisture.

Practically all of this land is cleared and under cultivation, growing beans, wheat, clover, and alfalfa. This soil type is recognized as a good bean soil, yields of 20 and 25 bushels per acre having been obtained. (Pl. XLIII, fig. 1.) Wheat does fairly well and clover and alfalfa produce from 1½ to 2½ tons of hay per acre.

FARMINGTON STONY LOAM

The surface soil of Farmington stony loam, from 4 to 6 inches deep, may be a light-brown, brown, slightly reddish brown, or dark-brown stony or gravelly loam. The finer soil material is a silt loam or loam, being friable and mellow. Scattered over the surface and mixed with the soil are many slightly rounded stones, principally of limestone origin. When dry the surface soil has a grayish-brown color. The subsoil, to depths varying from 8 to 15 or more inches, consists of a lighter-brown, slightly reddish brown, or yellowish-brown, compact yet friable, loamy or silty loam material, which contains a variable quantity of stones. The subsoil is underlain by limestone. Outcrops of rock are common, and commonly the bedrock lies only a few inches below the surface. The limestone contains considerable chert. The source of the parent soil material is principally the underlying limestone rock, some glacial till, shale, and crystalline rock materials being mixed with the parent material.

This soil occurs northeast of Le Roy on a large, comparatively smooth plain, in the vicinity of Morganville, west of Stafford, north and northeast of Batavia, along the Helderberg escarpment west of Oakfield, and near Indian Falls. The soil occurs on comparatively smooth plains where the glacial till has been largely removed or was never deposited, and along steep breaks or limestone escarpments. The topography of areas of Farmington stony loam varies from comparatively smooth and gently sloping to rough.

Drainage is fair to good and the soil is inclined to be droughty, owing to its shallow depth to bedrock.

Only about 5 per cent of this land is under cultivation, though a considerable part is used for pasture. (Pl. XLIII, fig. 2.) The larger part of the land supports a growth of oak, hickory, and other hardwoods. Some grain and hay crops are grown, but the yields are comparatively light. This soil, being too stony and shallow for farming, is best suited for forestry and grazing.

FARMINGTON STONY SILT LOAM

The surface soil of Farmington stony silt loam, to a depth of 6 or 8 inches, is a brown, dark-brown, or grayish-brown (when dry) stony or gravelly silt loam. The finer soil material is a mellow silt loam. The subsoil is brown, reddish brown, or slightly lighter brown in color, and consists of a more compact and heavy silt loam material which contains considerable stone and chert gravel. The underlying limestone rock usually occurs at depths ranging from 15 to 20 inches below the surface; in many places it outcrops or comes within a few inches of the surface. This soil is similar to the stony loam of this same series, except that the finer soil material has a silt loam texture. In many places the larger stones have been removed from the fields, and stone fences and rock piles are common where any of the land is under cultivation.

Farmington stony silt loam occurs principally northeast and north of Le Roy, in close association with Farmington stony loam. The topography varies from gently sloping or undulating to comparatively level. Drainage is fair to good, and the soil is inclined to be droughty on account of its shallow depth.

Approximately 40 or 45 per cent of this land has been cleared, and is used for pasture and for the growing of small grains, corn, and some clover, alfalfa, and timothy. Yields are only fair, being below those obtained on the Honeoye soils. Oak, hickory, and other hardwoods grow on the uncleared land. This kind of land has comparatively low agricultural value.

MAHONING SILT LOAM

The surface soil of Mahoning silt loam, about 5 or 8 inches deep, may be a light-brown, grayish-brown, or brownish-gray silt loam, heavy silt loam, or silty clay loam. The gray color is pronounced when the soil is dry. During dry seasons the surface soil tends to crack and bake. The upper subsoil, to depths ranging from 15 to 24 inches, consists of a compact heavy silt loam or silty clay loam material, highly mottled with gray, yellow, and rust-brown, and has a decidedly greasy feel. The lower subsoil, below a depth of 24 inches, consists of a gray or drab, heavy, compact and impervious silty clay or clay, slightly mottled with yellow. In a few places the underlying shale rock occurs at a depth of about 3 feet. The surface soil represents an admixture of glacial till and residual material from shale, the lower subsoil material being derived largely from the underlying shale. Where typically developed the soil shows little or no carbonate of lime within a depth of 3 feet, though there are a few areas in which the material is slightly calcareous at a 3-foot depth. The soil in the areas mapped north of East Alexander and near Sawens are calcareous along the lower slopes. This soil is free from stone and gravel, though in places there is considerable till material scattered over the surface.

A narrow strip of land lying east of Byron along the West Shore Railroad represents a variation from typical Mahoning silt loam. The surface soil here is more nearly like that of the Honeoye soils, and the lower subsoil material is reddish brown, mottled gray, and yellow, having a pinkish cast in places. The subsoil is heavier in

texture than the surface material, though it is not so compact as in case of the typical soil.

Mahoning silt loam is rather extensive in Genesee County, occurring principally in the south-central and southwestern parts. It is confined to the hill section.

The topography of this land varies from gently rolling to comparatively steep in places along stream courses. For the most part the surface relief is favorable to cultivation. Surface drainage is fair to good, but underdrainage is poor to deficient, owing to the compact nature of the subsoil. The soil is very deficient in organic matter and lacks lime.

About 65 or 70 per cent of this land is under cultivation, growing timothy and clover, small grains, corn, potatoes, and beans. Hay yields from 1 to 1½ tons per acre, wheat from 15 to 20 bushels, oats from 35 to 45 bushels, and corn produces only moderate yields. Potatoes and beans do fairly well, but not so well as on the Mohawk, Honeoye, and other soils farther north. Some fruit, principally apples and pears, is grown with good results. A large acreage of the land is used for pasture in connection with dairying. The current value of Mahoning silt loam varies from $40 to $60 an acre.

The following table shows the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Mahoning silt loam:

Mechanical analyses of Mahoning silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163022	Surface soil, 0 to 6 inches	1.4	1.2	0.8	7.6	7.2	51.4	30.4
163023	Subsurface, 6 to 25 inches	.2	.4	.2	1.2	2.8	48.4	46.9
163024	Subsoil, 25 to 36 inches	.0	.1	.1	4.2	2.9	55.1	37.5

CANFIELD SHALY SILT LOAM

The surface soil of Canfield shaly silt loam, about 5 or 7 inches deep, may be light brown, yellowish brown, grayish brown, or grayish (when dry). It is a mellow silt loam having a high content of fine angular fragments of shale. A small quantity of glacial till material, principally from crystalline rocks, is present in the surface layer. The upper subsoil, to a depth of 15 or 20 inches, consists of a yellowish-brown or pale-yellow shaly silt loam material, slightly mottled with gray, and slightly compact, though friable and crumbly. This portion of the subsoil resembles that of the Lordstown soils. The lower portion of the subsoil, to a depth of 3 or more feet, is a grayish-brown or gray shaly material, mottled with gray, yellow, and brown. It is rather compact and heavy, and has a silt loam or silty clay loam texture. In places the lower subsoil more nearly resembles that of the Volusia or Mahoning soils, though not so compact and heavy. The shale fragments become more abundant with depth, and in places the shale rock occurs within a depth of 3 feet.

This soil represents an intermediate stage of development between the more friable Lordstown soils and the Mahoning soils. The surface soil represents a mixture of till material and small angular fragments of shale. The material constituting the lower subsoil is derived largely from the underlying shale rock. The soil is noncalcareous, and it is deficient in organic matter and lime. Applications of lime and manures and the turning under of cover crops would improve this soil.

Canfield shaly silt loam is confined to the southwestern part of the county, along the Wyoming and Erie Counties lines. It aggregates only a few square miles.

The topography of the areas of this soil varies from gently rolling to undulating. A small area along the Wyoming County line is comparatively smooth, and represents more nearly comparatively smooth terrace or bench land. Surface drainage is good, except for a few small swales or slight depressions. Underdrainage is fair to good, through the lower subsoil, being slightly compact and heavy, retards water movement to some extent.

Some of this land is still forested, though about 60 per cent of it has been cleared and is used for the growing of wheat, oats, rye, buckwheat, and timothy. The yields of small grains are below the yields obtained on the calcareous soils to the north, and hay yields vary from 1 to 1½ tons per acre. Some clover is grown, but it does not do well on account of the lack of lime in the soil. Land of this kind has a current value varying from $40 to $75 an acre.

ALLIS SILTY CLAY LOAM

The surface soil of Allis silty clay loam, from 6 to 8 inches deep, is a silty clay loam, light brown, grayish brown, or brownish gray in color, having a decidedly grayish cast when dry. There are spots where the soil is more nearly a smooth silt loam or a heavy silt loam. Small fragments of shale are common on the surface and in the soil, but these do not interfere with cultivation. The subsoil, to a depth of 20 or 25 inches, consists of a heavy and rather compact silty clay or clay, highly mottled with gray, yellow, and rust-brown. Small fragments of shale are common in the subsoil. The underlying gray shales are encountered at a depth of 20 or 25 inches below the surface. At a depth of about 3 feet the material is partly weathered gray and dark-colored shale. Outcrops of shale are common on the steeper slopes, and in many places the shale comes within a few inches of the surface.

This soil is mapped as comparatively narrow areas on the steeper slopes or breaks along stream courses in the southern part of the county, or hilly section, and it occurs in close association with the Mahoning soils. In a few places, where more of the glacial till material is included, this soil occurs in close association with the Darien soils. In such places the soil shows that a little lime carbonate is present in the subsoil. This soil is mapped principally east of East Alexander, near West Bethany, west of Alexander, and south and southeast of Darien.

Some of the land is too broken and steep for farming, especially on the breaks along the stream courses. (Pl. XLIV, fig. 1.) Some of the more smooth and favorable areas are cultivated.

Allis silty clay loam is very low in organic matter, and it is generally lacking in lime. Applications of lime and the turning under of manures and cover crops would prove beneficial and also increase crop yields.

Not more than 25 per cent of this land is farmed, largely because of its unfavorable topography. Much of it supports a forest growth or is used for pasture. On the cultivated areas wheat, rye, buckwheat, oats, beans, potatoes, and hay, principally timothy, are grown. The yields are below the average of those obtained on the calcareous soils of the northern part of the county.

Included in mapped areas of Allis silty clay loam are patches in which the surface soil, to a depth of 4 or 6 inches, is a light-brown, yellowish-brown, or grayish-brown silt loam. In these small areas the soil contains a large quantity of angular fragments of shale. The soils in these small areas are closely associated with the Allis silty clay loam, but they contain more shale fragments in the surface layer and the finer material is more nearly a silt loam.

The following table gives the results of mechanical analyses of samples of the surface soil and subsoil material of Allis silty clay loam:

Mechanical analyses of Allis silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163014	Surface soil, 0 to 8 inches	0.2	0.4	0.4	3.0	5.0	49.4	41.5
163015	Subsoil, 8 to 22 inches	.1	.2	.2	1.4	4.6	60.4	33.1

LORDSTOWN SHALE LOAM

The surface soil of Lordstown shale loam, to a depth of 5 or 7 inches, is light brown, yellowish brown, or grayish brown (when dry). It contains a large quantity of small angular fragments of light-colored shale. The upper portion of the subsoil, to depths varying from 18 to 24 inches, consists of a friable and loose shaly loam material, yellowish brown or yellow in color, and underlain by a somewhat more compact grayish-brown or yellowish-brown shaly material or partially weathered shale rock. There is little or no compactness within a depth of 3 feet. The soil material is noncalcareous, and the soil is deficient in organic matter. Only a small quantity of till material is present, since the parent material is largely residual, being derived from the underlying shale.

This soil type is of minor importance in the county, as only a few small areas were mapped, as west of Bethany and south and southeast of Darien Center. In some places the soil occurs on slight ridges and in other places it occurs along the drainage courses. Some of this land is too broken for farming. The more level areas are cropped to small grains, corn, and potatoes. Small-grain crops yield only fair returns, but potatoes do well on this soil and yields are comparatively high. Agriculturally this soil is not of much importance in the county, as there are only a few small areas mapped and only a small acreage of it is suited to farming.

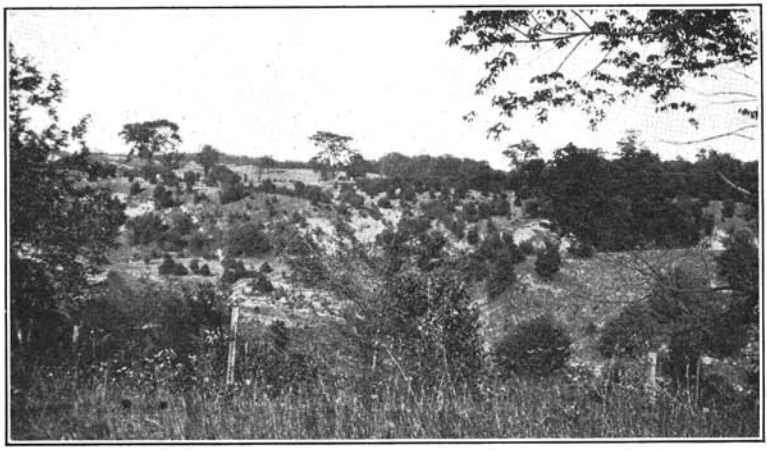

FIG. 1.—ERODED AREA OF ALLIS SILTY CLAY LOAM USED FOR PASTURE

FIG. 2.—TOPOGRAPHY OF GROTON GRAVELLY LOAM

FIG. 1.—APPLES GROWN ON PALMYRA GRAVELLY LOAM ABOUT 2 MILES SOUTH OF BATAVIA

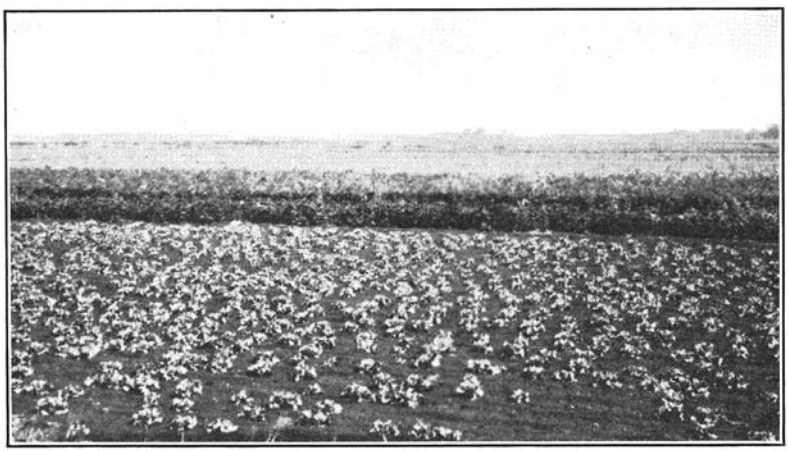

FIG. 2.—LETTUCE ON DEVELOPED MUCK LAND NORTH OF ELBA

TRUMBULL SILTY CLAY LOAM

The surface soil of Trumbull silty clay loam, to a depth of 8 or 10 inches, is a dark grayish-brown, grayish-brown or brownish-gray (when dry) heavy silt loam or silty clay loam. In a few small areas the surface layer is nearly black in color. The upper part of the subsoil, to a depth of 18 or 20 inches, is a heavy, compact silty clay or clay, mottled with gray, yellow, and drab, with some rust-brown. In some places the mottlings are pronounced and the material is slightly gritty. The lower portion of the subsoil, to a depth of 3 or more feet, consists of a gray, drab, or bluish-gray impervious clay. The soil is free from stones and gravel.

Trumbull silty clay loam is mapped in the southern and southwestern parts of the county. There are only a few comparatively large areas, most of the areas occurring as small elongated strips. This soil where typically developed contains little or no lime to a depth of 3 feet, but where it occurs in association with the better-drained calcareous soils the lower subsoil is slightly calcareous.

Trumbull silty clay loam occurs on smooth, nearly level areas and in gently sloping swales or depressions. Generally the land is poorly drained, owing to the nearly level surface and the presence of a heavy subsoil.

Much of this land is forested with elm, maple, and other trees, practically all of it being used for pasture land. Not more than 8 or 10 per cent of the land is used for crop production, because natural drainage is so poor. Hay and some small grains are grown on the better-drained areas. Hay yields from 1 to 1¼ tons per acre. Grain yields are moderate.

This type of soil is in need of drainage. It has a low content of organic matter and it is deficient in lime.

Land of this kind is not in much demand, so that its current value is comparatively low.

PALMYRA GRAVELLY LOAM

The surface soil of Palmyra gravelly loam, from 8 to 12 inches deep, is a brown, light-brown, or dark-brown gravelly loam. It is friable and mellow and contains a moderate quantity of rounded gravel, though not in sufficient quantity to interfere in any marked degree with cultivation. In places there are some rounded stones scattered over the surface. The upper subsoil, to a depth of 25 or 30 inches, consists of a brown, slightly reddish brown, or yellowish-brown gravelly loam material, which is slightly more compact than the surface material. Above a depth of 3 feet the material consists of stratified gravel and sand, including some loamy material. Beginning at a depth of 3 feet the material effervesces with acid, showing the presence of lime carbonate.

The parent material from which the soil has developed originated largely from limestone, shale, and crystalline rock, material from limestone predominating. The material had been reworked and deposited by water in the form of terraces along the stream courses or as sediment in lakes, forming benches or old lake plains. The terraces occur several feet above the present streams, so that they are seldom overflowed.

The Palmyra gravelly loam is typically developed in the vicinity of Batavia, Pavilion Center, East Bethany, Bushville, Attica, and Darien, and in small areas elsewhere in the county. Its total acreage in the county aggregates 12.8 square miles.

This type of soil occurs on smooth and nearly level to slightly undulating stream terraces or plains, being very favorable land for intensive farming. Surface drainage and underdrainage are good.

Practically all of the land is cleared and under cultivation. Wheat, oats, alfalfa, clover, beans, potatoes, cabbage, corn, and truck crops are grown, and the yields are about the same as those obtained on the Honeoye soils. Some apples are grown in commercial quantities in the vicinity of Batavia and the yields are good. (Pl. XLV, fig. 1.) This soil is easily worked and is fairly well supplied with organic matter.

Land of this kind is highly prized for general farming, its current value ranging from $100 to $150 an acre.

PALMYRA SANDY LOAM

Palmyra sandy loam, to a depth of 10 or 12 inches, consists of a brown or dark-brown sandy loam. In places the surface material has a reddish-brown color and is more of a very fine sandy loam or a fine sandy loam, and in other places it is coarser than sandy loam. The surface soil contains little or no stone or gravel. The subsoil, to a depth of 25 or 30 inches, is a yellowish-brown to grayish-brown sandy loam or coarse sandy loam material, friable and slightly compact. At a depth of 30 or 36 or more inches the material consists of grayish-brown stratified sand and fine rounded gravel. In places the sand and gravel occur at a depth of 20 or 25 inches below the surface. The gravel represents limestone, sandstone, shale, and crystalline rocks, the limestone fragments predominating. The parent material at the lower depths is calcareous.

This soil type is derived from water-transported materials which had been deposited as terraces along old stream courses or which had been reworked and deposited in lakes near the close of the glacial period. Thus Palmyra sandy loam occurs principally on the terraces and bench lands along Tonawanda Creek west of Batavia, between Indian Falls and North Pembroke, and near South Byron. This type of soil is not extensive in this county, aggregating only a few square miles.

The terraces are from 10 to 20 or more feet above the level of the streams and are seldom, if ever, overflowed. They are smooth and gently sloping to slightly undulating. The soil is well drained and takes up moisture easily, but is not inclined to be droughty, so that crops seldom suffer from lack of soil moisture.

From 90 to 95 per cent of this land is under cultivation, growing wheat, oats, rye, alfalfa, clover, timothy, beans, potatoes, cabbage, and corn. The soil is easily tilled and produces comparatively high yields. Land of this kind is in demand for general farming, and its current value varies from $75 to $150 an acre.

GROTON GRAVELLY LOAM

Groton gravelly loam, to a depth of 7 or 10 inches, is a light-brown or brown gravelly loam which contains a high percentage of rounded

gravel. In places the surface material is more nearly a gravelly sandy loam, and has a grayish-brown color when dry. The subsoil, to depths varying from 24 to 36 inches, is lighter brown in color, or slightly yellowish brown, and the material is slightly more compact than the surface material. With depth the gravel content increases until the substratum is reached, which consists of stratified beds of rounded gravel and sand. In places the subsoil material is reddish brown. Rounded gravel is scattered over the surface and in the soil, however not in quantities to interfere with cultivation.

This soil is derived from materials which have been deposited by flowing water under the ice or near the edge of the ice sheets during the glacial period. The materials are stratified, and the gravel is all rounded. The gravel is derived from limestone, shale, red sandstone, and crystalline rocks, the limestone gravel predominating. The parent material and the finer soil material composing the lower part of the subsoil are calcareous.

Groton gravelly loam is mapped principally south and northwest of Batavia. It is associated with the Ontario and Honeoye soils. The surface of these areas is rolling. (Pl. XLIV, fig. 2.) In places the grades of the slopes range from 20 to 30 per cent, but such slopes are rarely cultivated, they being used for pasture instead. The land occurs on kames, eskers, and rolling moraines or elongated ridges. Most of the land can be successfully farmed.

Surface drainage and underdrainage are good. During the drier years the soil is inclined to be droughty on account of the loose, friable nature of the subsoil, but crops seldom suffer for lack of soil moisture, as the rainfall is generally well distributed and sufficient for crop needs.

About 65 or 75 per cent of the land is cleared, and produces wheat, oats, alfalfa, timothy, and clover. Alfalfa and other hay crops yield from 2 to 3½ tons per acre. Corn, beans, potatoes, and cabbage produce good yields, comparable with those obtained on the Honeoye soils in the better years. This soil is easily tilled. Though it is comparatively well supplied with organic matter, manures and green-manure crops should be plowed under for soil improvement. The current value of this kind of land ranges from $75 to $100 an acre.

GROTON GRAVELLY CLAY LOAM.

Groton gravelly clay loam consists of a dark grayish-brown or dark brownish-gray topsoil of gravelly clay loam, from 6 to 10 inches deep, underlain by a dark-brown or dark grayish-brown subsoil material which is heavier in texture than a gravelly silty clay loam. The deeper substratum consists of stratified beds of rounded gravel with some fine material. The topsoil contains considerable rounded, dark-colored shale gravel, likewise the lower portion of the subsoil.

This soil is much darker in color than the typical Groton soils, because the parent material from which the soil is derived consists largely of dark-colored or nearly black shale, with some gravel of limestone and crystalline rocks. At a depth of 3 feet the soil material is calcareous. The topography of areas of this soil is rolling. The land has good drainage, and it is not inclined to be so droughty as the Groton gravelly loam.

Groton gravelly clay loam is confined almost exclusively to Darien and Alexander Towns, in the southwestern part of the county. The largest areas are mapped southeast of Darien and north of Ray. Its total area aggregates only a few square miles.

About 80 or 90 per cent of the land is under cultivation, and the remainder is in forest and is used for pasture. This soil is considered suitable for growing a number of crops. Corn yields from 5 to 7 tons of silage per acre, wheat from 25 to 30 bushels, oats from 50 to 60 bushels, potatoes from 100 to 150 bushels, beans from 25 to 30 bushels, cabbage from 15 to 20 tons, and alfalfa from 2 to 3 tons. Some fertilizer is used, principally a 2–8–10 mixture. A crop rotation consisting of wheat, oats, clover, corn (or beans or potatoes), and then alfalfa for 3 to 5 years, is commonly practiced.

The current value of this kind of land ranges from $100 to $150 an acre where it is developed and well improved.

GROTON VERY FINE SANDY LOAM

The topsoil of Groton very fine sandy loam, to a depth of 8 or 10 inches, may be light brown, brown, or grayish brown, and it is mellow and loose and free from stones or gravel. The upper portion of the subsoil, to a depth of 20 or 25 inches, consists of a yellowish-brown or yellow fine sandy loam or loamy fine sand material, which is somewhat more compact than the surface material. In a few patches the subsoil consists of a reddish-brown silty clay. At a depth of 3 feet the material may be yellowish-brown or yellow stratified sand and fine gravel, and in places it contains some lime. Usually the topsoil is lacking in lime. In some places the reddish-brown or pinkish-colored clay lies near the surface or outcrops.

The topography of this land is rolling, with slight potholes or depressions. Some of the slopes are steep, though there are none that continue for any distance. Drainage is good to excessive, owing to the loose, open nature of the subsoil material.

Groton very fine sandy loam occurs principally between Pembroke and East Pembroke, and in the vicinity of North Pembroke, in the western part of the county. This kind of land is not extensive in the county, aggregating only 4.1 square miles. About 85 or 90 per cent of it is under cultivation, growing small grains, potatoes, cabbage, beans, corn, and hay. The yields are fair to good, though not so high as those obtained on Groton gravelly clay loam.

This soil is low in organic matter, so that manure and green-manure crops should be turned under for soil improvement.

The following table gives the results of mechanical analyses of samples of the topsoil and subsoil of Groton very fine sandy loam:

Mechanical analyses of Groton very fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
1630115	Topsoil, 0 to 9 inches	1.0	0.6	0.4	41.0	26.2	22.9	8.0
1630116	Subsoil, 9 to 36 inches	.2	.2	.2	60.6	26.8	9.3	2.8

DUNKIRK FINE SANDY LOAM

The surface soil of Dunkirk fine sandy loam, from 6 to 10 inches deep, is a light-brown or slightly grayish brown mellow and friable fine sandy loam, free from stones or gravel. In places the texture is a very fine sandy loam or a fine sand. The upper subsoil, to a depth of 20 or 25 inches, is a yellow or yellowish-brown fine sandy loam or fine sand material, loose and porous. At a depth of 36 or more inches the material is light brown or grayish, and in places it is slightly mottled with yellow and gray, with some rust-brown streaks. The texture of this layer ranges from fine sandy loam to somewhat compact silt loam. In many places the deeper material consists of stratified fine sand with thin layers of silt material and silty clay, and in other places it consists of stratified sand and rounded gravel. There is considerable variation in the lime content of this deeper unweathered material. In general the underlying fine sand is largely quartz which does not carry sufficient lime to effervesce. The interstratified finer materials, especially the clay and silty clay, are in many places calcareous.

This soil comprises the undulating, gently rolling, and comparatively smooth lands in the northeastern, northern, northwestern, and western parts of the county, and it also occurs on small scattered areas which are outwash plains, margins of lake plains, and lake basins. The parent material was deposited by water. Drainage is good to excessive. On the sandier parts and where the subsoil is loose and porous the soil is not retentive of moisture, so that crops suffer during the drier seasons.

About 75 or 80 per cent of the land has been cleared, and grows wheat, oats, cabbage, beans, potatoes, corn, rye, and grass. Potatoes and truck crops produce good yields. Small grains produce fairly high yields in seasons of sufficient rainfall. Grass crops are comparatively light. This soil is well adapted to truck crops and small fruits, and its current value is $100 or more an acre.

Dunkirk fine sandy loam, sandy phase.—Dunkirk fine sandy loam, sandy phase, may consist of light-brown, grayish-brown, or brownish-gray (when dry) loamy fine sand, fine sandy loam, or very fine sandy loam, from 4 to 8 inches deep, underlain by a yellow fine sand or fine sandy loam material, and at a depth of 20 or 25 inches by a slightly mottled gray, yellow, or pale-yellow loose fine sand or fine sandy loam material. In many places the material at a depth below 3 feet consists of stratified fine sand and gravel, with some silty material. The topsoil is loose and free from stones or gravel.

In many places this soil occurs on slight ridges and old beaches. It lies at elevations slightly above the smoother Fulton soils. Drainage is good to excessive. The soil is not retentive of moisture, consequently during the drier seasons crops suffer from lack of soil moisture.

A few small areas of the sandy phase of Dunkirk fine sandy loam occur north of Oakfield, where the surface is more rolling. Here the soil is similar to the Groton soils. This sandy Dunkirk soil occurs principally in the northern, northwestern, and western parts of the county as comparatively small tracts.

About 85 or 90 per cent of this soil is under cultivation, and grows small grains, hay, corn, vegetables, and some small fruits. Yields

are similar to those obtained on Dunkirk fine sandy loam. It is well adapted to vegetable and truck crops, as well as to small fruits.

The soil is low in organic matter, and all manures and cover crops should be plowed under to improve the soil. It is easily tilled and warms up early in the spring. The current value of this sandy land is $100 or more an acre.

DUNKIRK SILT LOAM

The surface soil of Dunkirk silt loam, from 6 to 10 inches deep, is a light-brown or grayish-brown mellow silt loam, though there are some small spots where the material is more nearly a fine or very fine sandy loam. In dry cultivated fields the soil has a grayish cast. The upper part of the subsoil, to a depth of 20 or 25 inches, may be a yellowish-brown, light-brown, or grayish-brown, more compact but friable, silt loam material. At a depth of 3 or more feet the material is rather compact, having a somewhat heavy silt loam texture.

This soil type is not extensive in the county, occurring only as a few small areas in the northwestern part. These areas are smooth, gently sloping, or comparatively level. Drainage is fair to good, though some of the land would be benefited by artificial drainage.

About 85 or 90 per cent of this land has been cleared and is under cultivation, growing corn, small grains, potatoes, and particularly timothy and clover. Hay crops do well and yield from 2 to 2½ tons per acre. The yields of other crops are fairly good. The soil is in need of organic matter and lime.

SCHOHARIE SILT LOAM

Schoharie silt loam consists of a brown, light-brown, or grayish-brown silt loam or heavy silt loam, from 6 to 10 inches deep, underlain, to a depth of 20 or 25 inches or more, by a compact and heavy reddish-brown or pinkish-colored silty clay or clay. The soil is free from stones and gravel, and at a depth of 3 or more feet the material is a reddish-brown compact yet friable silty clay or clay, having a pinkish tinge and streaked with gray and with some yellow in places. This deeper portion of the subsoil is calcareous, the gray streaks being carbonate of lime. The lower subsoil in places consists of stratified fine sand, silt, and clay.

The parent materials from which this type of soil is derived are lake deposits of silt and clay, which were laid down in shallow water near the close of the glacial period. The finer soil material originated largely from limestone, red sandstone, and pinkish-colored shale. In places the old lake deposits overlie unassorted glacial till, the finer soil material overlying the till as a veneer.

This soil in cultivated fields has a reddish or pinkish cast after rains, and is grayish brown or brownish gray when dry. In a few places, as on the more poorly drained areas, the soil material immediately below the surface soil is slightly mottled with gray, yellow, and rust-brown.

Schoharie silt loam occurs principally in the vicinity of and north of Horseshoe Lake and northeast of Batavia. Its total area in the county is only a few square miles. Horseshoe Lake and

Godfrey's Pond are remnants of a lake that once occupied this section.

The surface relief of this land is smooth and gently sloping or undulating, there being only a few steep slopes along some breaks to the stream courses. Surface drainage is fair to good, but underdrainage is deficient, owing to the heavy compact subsoil. Tile drainage would be beneficial on much of this land.

About 90 or 95 per cent of this land is under cultivation, devoted to the growing of small grains, hay, beans, potatoes, and corn. Small grains and hay produce good yields, likewise corn for silage. Wheat yields vary from 18 to 25 bushels, hay from 1½ to 2½ tons, and beans from 15 to 20 bushels per acre. A rotation commonly practiced on this soil consists of wheat, followed by clover or hay for one, two, or three years, then corn, and then beans or potatoes.

This soil tends to bake when it dries out, and clod if it is plowed too wet, so that it can not be worked under a wide range of moisture conditions. The soil, being deficient in organic matter, needs farm manures as well as green manure to increase its supply of organic matter and to improve its physical condition. The current value of this kind of land ranges from $75 to $100 an acre.

Schoharie silt loam, heavy phase.—Schoharie silt loam, heavy phase, has a topsoil consisting of a brown or light-brown silty clay loam or silty clay, from 4 to 8 inches deep, which is rather heavy and tends to bake and crack in dry weather. It is free from stones, and in dry cultivated fields it has a pronounced grayish-brown or brownish-gray cast. The subsoil, to a depth of 25 or more inches, is a reddish-brown heavy and compact silty clay or clay. In places it has a decidedly pinkish cast. At a depth of 3 or more feet the material is reddish brown or grayish brown, and in places streaked with gray and in other places streaked with yellow, the gray streaks being more common. The substratum consists of a slightly less compact though heavy silty clay or clay, free from stones and gravel. This deeper material is calcareous, the gray streak in it being carbonate of lime. In a few places the lower subsoil is underlain by layers of gray and yellow fine or very fine sand and silt. This soil in cultivated fields has a pinkish cast, owing to the plowing up of the underlying reddish or pinkish subsurface material.

The heavy phase of Schoharie silt loam is not extensive, and it is mapped principally in the vicinity of Horseshoe Lake, northeast of Batavia. The surface of this land varies from comparatively smooth to slightly rolling or undulating. In most places it occurs on the slopes bordering the streams, these slopes being comparatively steep and not suited for cultivation. Surface drainage is fair to good, but underdrainage is retarded by the heavy compact subsoil material.

Some of the steeper slopes are covered by a scrubby growth of trees, but most of the land has been cleared and produces fair to good yields of small grains and hay. Hay yields from 1 to 1½ tons per acre, wheat from 15 to 20 bushels, and oats from 35 to 50 bushels. This soil is not desirable for general farming, as it is hard to handle properly, owing to its tendency to bake and clod, though it can be worked under favorable moisture conditions.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of typical Schoharie silt loam:

Mechanical analyses of Schoharie silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163093	Surface soil, 0 to 7 inches	0.6	1.2	1.0	8.4	9.2	56.8	22.8
163094	Subsurface, 7 to 21 inches	.1	1.1	1.1	9.0	8.2	48.3	32.0
163095	Subsoil, 21 to 36 inches	.4	1.8	1.2	7.6	5.5	52.5	31.0

POYGAN SILTY CLAY LOAM

The topsoil of Poygan silty clay loam, to a depth of 5 or 8 inches, is a brown, light-brown, or grayish-brown heavy silt loam or silty clay loam. In a few places the color of the surface material is dark brown, such areas being more poorly drained, as they occur in swales or depressions. The upper portion of the subsoil or subsurface material, to a depth of 15 or 18 inches, is highly mottled with gray, yellow, and rust-brown, and is underlain by more reddish-brown or pinkish-colored material. At a depth of 3 feet the subsoil is heavier and more compact than the surface material, and is underlain to a depth of 30 or 36 inches by a plastic and impervious clay, reddish brown to slightly pinkish in color, with some gray streaks. In most places the lower subsoil material is old lake deposit consisting of heavy plastic clay having a decidedly reddish or pinkish color.

Areas of this soil are smooth and nearly level or flat, occurring in slight depressions, formerly old lake beds. Thus the drainage of this land is poor, so that artificial drainage would prove beneficial.

Poygan silty clay loam is not extensive in the county. It is mapped as small areas north of Batavia, northwest of Bergen, and near Byron. About 80 or 90 per cent of it has been cleared, most of it being used for pasture land and for hay. Where it is well drained corn yields fairly well, likewise wheat and oats.

The following table gives the results of mechanical analyses of samples of the surface soil and subsurface and subsoil materials of Poygan silty clay loam:

Mechanical analyses of Poygan silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
1630128	Surface soil, 0 to 6 inches	1.5	1.4	1.4	10.2	14.6	47.6	23.3
1630129	Subsurface, 6 to 12 inches	.8	2.4	2.6	17.0	19.6	33.5	24.2
1630130	Subsoil, 12 to 36 inches	.6	1.4	1.0	7.6	10.6	30.5	48.4

FULTON SILTY CLAY LOAM

Fulton silty clay loam consists of a dark grayish-brown or brownish-gray silty clay loam, from 7 to 10 inches deep, underlain, to depths varying from 18 to 25 inches, by a layer of heavy silty clay or clay which is highly mottled with gray, yellow, and rust-brown. At a depth of 3 or more feet the material is a gray or drab heavy impervious clay. The soil is free from stones and gravel, and in dry cultivated fields it assumes an ash-gray color. In a few places the lower subsoil consists of layers of gray and yellow fine sand, with some pinkish clay.

The parent material consists of fine-textured sediments which were deposited in lakes during the glacial period, originating mainly from sandstones and shale. It is noncalcareous, or contains no carbonate of lime.

The Fulton silty clay loam is rather extensive in Genesee County, occurring principally south, west, and southwest of Batavia, in the vicinity of Corfu, and in the northwestern part of the county. Large areas of the soil occur in the northern part of the county in association with the muck soils of Oak Orchard Swamp. Its total area aggregates 29.6 square miles. Areas of this soil have a smooth, nearly level or slightly undulating surface. Drainage is poor or deficient, owing to the nearly level topography and the compact subsoil.

About 40 or 50 per cent of this land has been cleared, and is used for growing hay, wheat, oats, beans, and potatoes. Most of it is used for the production of hay and pasturage. Wheat yields from 12 to 15 bushels per acre, oats from 40 to 50 bushels, and hay from 2 to 2½ tons per acre. Yields of potatoes and beans are comparatively low. Corn is grown principally for silage, yielding from 5 to 8 tons per acre.

The soil is heavy and can be cultivated only under favorable moisture conditions. It tends to clod, and when plowed too wet it tends to puddle and bake. The physical condition of the soil could be improved by artificial drainage and by the plowing under of barnyard manure and green-manure crops. The soil is cold and does not warm up readily in the spring. Most of it is best suited for pasture and hay. This kind of land has a much lower value than the better-drained upland soils.

Mapped areas of Fulton silty clay loam include several patches in which the surface soil, to a depth of 5 or 9 inches, is a dark grayish-brown or brownish-gray silty clay loam or silty clay, and in which the subsoil is a gray or drab compact clay, slightly mottled with yellow.

Areas of Fulton silty clay loam have a smooth, gently sloping, or slightly undulating topography, and they are poorly drained, owing to the flat surfaces and compact and impervious subsoils. The soil material is largely lake laid, originating mainly from shale and sandstone, and is noncalcareous. Most of this land is cleared, but not more than about 25 or 30 per cent of it is farmed, on account of poor drainage. Consequently most of it is used for pasture.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of typical Fulton silty clay loam:

Mechanical analyses of Fulton silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163045	Surface soil, 0 to 12 inches	0.2	0.2	0.2	0.8	1.5	58.8	38.4
163046	Subsurface, 12 to 28 inches	.1	.0	.0	1.4	2.2	50.5	45.7
163047	Subsoil, 28 to 36 inches	.0	.2	.2	1.0	1.4	51.8	45.4

GRANBY SILTY CLAY LOAM

Granby silty clay loam may consist of a dark grayish-brown, brownish-gray, or nearly black (in the virgin condition) silty clay loam, from 8 to 12 inches deep, underlain by a gray or drab subsoil consisting of fine sandy clay loam material, slightly mottled with yellow. This soil is free from stones and gravel. At a depth of about 3 feet the material consists of gray and drab sand, silt, and clay. In a few places the deeper material is gray or drab plastic clay, and in other places the subsoil is gray or rust-brown sandy loam material or fine sand. In places in virgin areas the surface layer resembles a silty muck or a somewhat peaty material. The materials from which this soil is derived are largely noncalcareous lake-deposited sediments, including fine sand and clay, with some accumulated organic matter.

This type of soil is rather extensive in the county, occurring as comparatively narrow strips or areas in association with the Honeoye, Ontario, and muck soils in the northeastern and eastern parts principally, though there are many small areas scattered throughout the county. The largest areas are west of Batavia and in the vicinity of Corfu. This soil occurs in swales or depressions, and it is poorly drained in its natural state.

Only a very small part of this land is cleared, most of it being forested with elm, basswood, and other woods, or is used for pasture. Not more than 10 or 15 per cent of it produces crops, which are timothy hay, corn, and some beans. Hay yields from 1 to 1½ tons per acre, beans from 10 to 12 bushels, and corn from 3 to 6 tons of silage.

In its natural state this soil has a very low agricultural value, owing to the fact that it is poorly drained. In its undrained condition it is best suited for forestry and grazing.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of Granby silty clay loam:

Mechanical analyses of Granby silty clay loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163065	Soil, 0 to 10 inches	4.4	1.0	1.2	11.8	9.4	40.9	31.5
163066	Subsoil, 10 to 36 inches	.2	1.2	2.6	30.0	43.0	17.9	5.2

GRANBY LOAM

The topsoil of Granby loam, from 6 to 10 inches deep, is a dark-brown, dark grayish-brown, or brownish-gray friable loam, free from stones and gravel. In places it is more nearly a fine sandy loam or a very fine sandy loam, though such areas are usually small. When dry it has a decidedly grayish cast. The upper portion of the subsoil, to a depth of 20 or 30 inches, consists of a gray or drab fine sandy loam or very fine sandy loam material, or layers of gray fine sand, silt, and clay. In places the upper subsoil is mottled with gray, yellow, and rust-brown. At a depth of 3 feet the material consists of layers of gray, drab, or bluish fine sand or clay.

In a few places this soil type resembles the Lyons soils in its lower subsoil, it being a grayish calcareous till. In other places the soil resembles the Trumbull soils in its lower portion. This type of soil is not extensive in the county, occurring principally in the southeastern part. It occurs in depressions or swales in association with the higher and better-drained soils. The surface of these areas is smooth and almost flat. Consequently drainage is poor or deficient. In its natural state this soil is slightly better drained than the Granby silty clay loam.

Only a small acreage of this land is under cultivation. A small percentage is used for growing hay, wheat, and corn for silage. Yields are generally low. Most of the land supports a growth of trees and is used for pasture, to which it is best adapted in the natural state.

TYLER FINE SANDY LOAM

The surface soil of Tyler fine sandy loam varies from 8 to 10 inches deep, and it may be dark grayish brown or brownish gray when moist, and more gray or ashy gray when dry. In some places the texture is somewhat coarser than a fine sandy loam, as in the area mapped west of Pembroke. In other small areas the texture is more nearly a very fine sandy loam. The upper portion of the subsoil, to a depth of 20 or 25 inches, consists of a gray, yellow, and rust-brown mottled fine sandy loam or sandy clay loam material, only slightly more compact than the surface layer. Below a depth of 3 feet the material is gray in color, tinged with yellow, and it has a fine sandy loam texture, or it may be layers of fine sand and clay. In cultivated fields the mottled subsurface material is plowed up in places, so that the field presents a spotted appearance. Generally the topsoil and subsoil do not contain stones and gravel in any quantity to interfere with cultivation.

The areas of Tyler fine sandy loam are nearly level or slightly undulating. Drainage is slightly better than on Tyler silt loam, as the subsoil is more open to allow water to percolate through it. The parent material is noncalcareous. Although the soil is easy to till crops are not planted until late, as the soil remains wet until late in the spring.

About 75 or 80 per cent of this land is cropped, the yields being about the same as those produced on Tyler silt loam. The needs of this type of soil are similar to those of Tyler silt loam.

The following table gives the results of mechanical analyses of samples of soil and subsoil of Tyler fine sandy loam:

Mechanical analyses of Tyler fine sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163057	Soil, 0 to 10 inches	0.6	17.8	8.6	51.2	2.4	11.6	7.8
163058	Subsoil, 10 to 28 inches	.0	2.6	6.5	69.2	8.4	7.2	6.1
163059	Subsoil, 28 to 36 inches	1.2	4.4	5.6	54.6	18.0	8.1	8.1

TYLER SILT LOAM

Tyler silt loam may consist of a mellow, grayish-brown, brownish-gray, or gray silt loam, from 6 to 8 inches deep, underlain by a subsoil which is highly mottled with gray, yellow, and rust-brown, and which may contain some nearly black iron accretions. This subsoil material is compact and has a heavy silt loam or silty clay texture. Below a depth of 3 or more feet the material is variable, ranging from layers of fine sand to grayish-brown or yellowish-brown fine sandy loam material and pinkish clay.

This soil has developed principally from stratified deposits which had been laid down in lakes. The parent material originated principally from sandstone and shale, and is noncalcareous. In cultivated fields the soil assumes a grayish color.

This type of soil is not extensive in the county. It occurs principally in Alabama Town, and aggregates less than 2 square miles. Areas of this soil are smooth and nearly level or slightly undulating. Drainage is only fair, so that most of the land could be materially benefited by artificial drainage.

About 75 or 80 per cent of this land is under cultivation, growing small grains, hay, potatoes, and corn. Hay yields from 1½ to 2 tons per acre, wheat from 15 to 20 bushels, and oats from 40 to 50 bushels per acre. Potatoes do not yield so well as on the better-drained and more open soils. Corn is grown principally for silage and the yields are good. Much of the land is best adapted to hay.

GENESEE SILT LOAM

Genesee silt loam may be a light-brown, brown, or dark-brown silt loam, from 10 to 15 inches deep, underlain by a brown, light-brown, or slightly yellowish brown subsoil which consists of a rather compact and heavy silt loam or silty clay loam material. At a depth of 3 feet the material is light brown or grayish brown, with some mottlings of gray, yellow, and rust-brown. In places this deeper material consists of stratified sand and silt.

The surface soil is mellow and it is easy to till under ordinary moisture conditions. For the most part it is free from stones and gravel. The parent material from which this soil has developed had been deposited along streams, originating from limestone, sandstone, shale, and some crystalline rocks. The parent material is usually calcareous at a depth of 3 feet from the surface. Included

in mapped areas of Genesee silt loam are some small patches of more poorly drained soils which resemble the Holly soils, these patches being too small to indicate on the map.

Genesee silt loam occurs as first bottom lands along Oatka, Black, Murder, Little Tonawanda, and Tonawanda Creeks. It is subject to occasional overflow during times of heavy rains, but the water does not stand on it for any length of time. The largest areas occur along Tonawanda Creek, in the south-central part of the county. Although this land is subject to overflow during high waters, it is ordinarily well drained. The surface is uniformly smooth, gently sloping or nearly level, conforming to the gradient of the stream. A few small areas could be improved by artificial drainage.

All of this land was originally forested, and a large part at present supports a growth of elm, maple, and other trees and shrubs. The better-drained land has been cleared and is used for growing hay, grain, corn, some potatoes, and cabbage. Hay yields from 1½ to 2½ tons per acre, and corn from 30 to 60 bushels or from 6 to 10 tons of silage. The yields of other crops are good. The more poorly drained areas are used largely for pasture. Where well drained and improved this is desirable farming land, having a current value ranging from $50 to $100 an acre.

This soil is well supplied with organic matter. At a depth of about 3 feet the subsoil material is slightly calcareous. More thorough drainage and light applications of lime would improve this soil.

GENESEE FINE SANDY LOAM

Genesee fine sandy loam may be a brown, dark-brown, or grayish-brown (when dry) fine sandy loam, from 8 to 12 inches deep, underlain by a lighter-brown, yellowish-brown, or grayish-brown subsoil consisting of a mellow and loose fine sandy loam material, which is somewhat more compact than the topsoil. Below a depth of 3 feet the material consists of grayish-brown or gray fine sand, or beds of fine sand and rounded waterworn gravel. In some places the topsoil is more nearly a loam. The lower subsoil material seldom shows the presence of any carbonate of lime, the parent material being largely of sandstone origin.

This type of soil, which occurs on the slight natural levees along the streams, is somewhat more sandy than typical. In such places the soil is loose and friable, and drainage varies from good to excessive.

Genesee fine sandy loam is not extensive in the county. It occurs principally along Allen Creek, north of Le Roy. Areas of it are smooth and gently sloping, and since they are only a few feet above stream level they are subject to occasional overflows. For the most part this land is well drained, though there are a few swales that would be benefited by tile or open ditches.

Originally all of the land was forested with elm, maple, and other trees. A considerable acreage along Allen Creek is still forested. The better-drained part has been cleared and is used for growing corn, some small grains, and vegetables. Most crops yield well. The soil is easily tilled and is well adapted to truck and vegetable crops.

TONAWANDA SILT LOAM

The topsoil of Tonawanda silt loam, from 8 to 12 inches deep, may be a mellow, brown, light-brown, grayish-brown, or even a dark-brown (in virgin condition) silt loam, which is generally free from stones and gravel. The upper portion of the subsoil, to a depth of 20 or 25 inches, may consist of a light-brown, yellowish-brown, or a mottled gray, yellow, and brown silt loam material, which is more compact and slightly heavier in texture than the surface soil. At a depth of about 3 feet occurs a mottled gray, yellow, and rust-brown, somewhat compact and slightly plastic silt loam or silty clay loam material. In places this deeper material consists of stratified fine sand and silt and in places the surface soil approaches a fine sandy loam or a fine sand. Such variations are of small extent, usually occurring at slight elevations or on natural levees near the streams.

Tonawanda silt loam has developed from outwash material originating from the adjacent uplands. None of the parent material is calcareous. This soil is first bottom land. Most of it occurs at elevations several feet above the streams, so that it is subject to overflow only in times of unusually high water.

This type of soil is not extensive in the county. The largest area occurs along Oatka Creek near Pavilion, in the southeastern part of the county. For the most part this land is fairly well drained, though there are some small areas that would be benefited by artificial drainage. This soil is better drained than the Holly soils.

About 80 per cent or more of this soil in the vicinity of Pavilion is under cultivation. Potatoes yield from 75 to 100 bushels per acre, wheat from 30 to 40 bushels, hay from 1½ to 2½ tons, oats from 50 to 60 bushels, cabbage from 10 to 14 tons, beans from 18 to 22 bushels, and alfalfa from 1 to 2 tons where the soil is properly limed. The soil is in need of more organic matter, and some of it is in need of better drainage. The current value of this land in the vicinity of Pavilion ranges from $60 to $100 an acre, depending on improvements.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of Tonawanda silt loam:

Mechanical analyses of Tonawanda silt loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
163007	Soil, 0 to 10 inches	0.2	1.6	1.8	13.6	18.8	52.2	11.8
163008	Subsoil, 10 to 30 inches	.0	.4	.4	11.4	18.6	48.0	21.1
163009	Subsoil, 30 to 36 inches	.2	1.2	2.4	21.6	22.8	38.0	13.7

HOLLY SILTY CLAY LOAM

The topsoil of Holly silty clay loam, from 6 to 10 inches deep, may be a dark grayish-brown, grayish-brown, or brownish-gray heavy silt loam or silty clay loam, generally free from stones or gravel. The upper portion of the subsoil, to depths ranging from 18 to 25 inches, is grayish-brown or brownish-gray impervious silty clay or clay, highly mottled with gray, yellow, and rust-brown. In

places it is olive drab in color. Below a depth of 3 feet the material is a highly mottled heavy plastic clay. In cultivated fields the soil has a pronounced grayish cast, and in virgin areas the surface material is dark brown or nearly black, owing to the presence of organic matter. In a few small areas the soil mapped as Holly silty clay loam resembles Tyler silty clay loam.

The parent material of Holly silty clay loam consists of sediments deposited along the streams, so that this type of soil constitutes the first-bottom lands which are subject to overflow. The original source of the parent material is shale. The soil does not show the presence of any lime within a depth of 3 feet.

This type of soil is not extensive in the county. It is mapped as comparatively narrow, first-bottom lands, principally in the southwestern part of the county, along Murder, Ellicott, and Tonawanda Creeks. In these areas swales or depressions are common, and the soil is poorly drained owing to its flat surface and the impervious subsoil. This soil is deficient in organic matter.

Originally all the land was forested with elm, maple, and other trees and shrubs, but most of it has been cleared. Only 20 or 30 per cent of this soil is under cultivation, most of it being used for pasture, for which it is best adapted in its natural state. Small grains are grown, but the yields are not so high as on the upland soils. Some corn for silage is grown with fair to good results, and a small acreage of beans is also grown. Timothy, and timothy and clover, mixed, yield from 1½ to 2 tons of hay per acre.

MUCK

Muck consists of vegetable matter in varying stages of decomposition, mixed with more or less sand, silt, and clay which has been washed in by drainage waters from surrounding uplands. The organic matter represents the remains of water plants. Some of the land in Genesee County mapped as muck more nearly resembles peat, in that the decomposition of the vegetable matter has not reached such an advanced stage as in case of muck. Peat is usually more or less fibrous and brownish in color, whereas true muck is black.

The surface layer of a muck soil as mapped in this county consists of dark-brown or black muck, varying from 15 to 25 inches deep, though in places there is considerable peaty material. In the virgin state the surface material is rather peaty, representing partially decomposed vegetable matter. The peaty material is fibrous and woody, and has a decidedly brownish cast when dry. The true muck material is usually more than 3 feet in depth, and in places is from 8 to 10 feet deep. In some places the underlying material consists of gray, drab, and bluish-gray fine sand, and in other places the underlying material is whitish marl full of small shells. The underlying marl and grayish-colored material is usually calcareous, whereas the muck is decidedly acid. Areas that have been under cultivation for some time more nearly represent true muck, with a little peaty material.

Areas underlain at shallow depths by marl are mapped in comparatively small tracts near Horseshoe Lake, north of East Bethany,

west of West Bethany, in the central plain section of the county. Muck lands occur on flats or smooth areas, or in depressions where the drainage conditions are poor or deficient and where the water table is high. A comparatively large acreage of muck is mapped in the county, but most of it is undeveloped land. The largest body of muck occurs along the Orleans County line, locally known as Oak Orchard Swamp. Smaller areas lie northeast, southeast, west, and southwest of Batavia. All such lands are locally referred to as "timber muck."

Originally all of the muck lands were forested with elm, maple, cedar, and basswood, and are now forested. A considerable acreage is being improved for the growing of truck crops. This land is in need of drainage in the virgin state. Large ditches with smaller laterals will drain the land and lower the water table, which is necessary before crops can be produced. Where it is properly drained muck produces good yields of onions, lettuce, carrots, celery, potatoes, spinach, and other truck crops. (Pl. XLV, fig. 2.) In the vicinity of Batavia there are several areas of muck on which truck crops are successfully grown, also on the muck on the farm of the Western New York Farms Co., in the Oak Orchard Swamp north of Elba. Onions yield from 500 to 1,000 bushels per acre, and lettuce from 600 to 1,000 crates. Celery is not so sure a crop as some of the other crops, on account of frosts.

Most of the muck lands farmed in Oak Orchard Swamp is rented by the holders in small tracts of 15 or 20 acres, the rent varying from $35 to $50 an acre. The tenants and vegetable growers in this section market their products through the Genesee-Orleans County Vegetable Growers Associaton, and most of the products are shipped from Elba to the city markets.

Fertilizers are used on onions, lettuce, and potatoes. On onions and potatoes a 2–8–10 mixture is used, and on lettuce a 3–12–3 mixture. About 1 ton per acre is used on onions and one-half ton on lettuce.

The cost of reclaiming muck land is comparatively high. The current value of well-drained and developed muck land varies from $400 to $600 an acre.

ROUGH BROKEN LAND

Areas mapped as rough broken land really represent a topographic feature rather than a soil difference. Such areas include steep broken slopes with numerous outcrops of rock, as the steep broken slopes along Allen Creek, the deep ravines near Morganville, the steep stony slopes along the Helderberg escarpment southwest of Oakfield, and the deep ravines along Tonawanda Creek near Indian Falls. This land is not suitable for farming.

On these rough broken areas the soil material is a light-brown or brown silt loam or loam, from a few inches to 10 or 12 inches deep. A reddish tinge in the soil material is common in places, where the rock lies near the surface. Where the soil material is from 12 to 15 inches deep the lower portion is a yellowish-brown or reddish-brown rather compact silt loam or silty clay material. On these areas erosion has been very active, owing to the steepness of the slopes. The soils here resemble the Farmington soils, but on account of the

steep broken nature of such areas the soils are classed as rough broken land.

Practically none of the rough broken land is under cultivation, but it supports a growth of oak, hickory, elm, and other hardwoods. It is suited for forestry and is used for pasture. The value of such land is determined largely by its timber value.

SUMMARY

Genesee County is in the northwestern part of the State of New York, about 20 or 25 miles south of Lake Ontario, and about the same distance east of Lake Erie. Buffalo to the west and Rochester to the northeast are about 25 or 35 miles from the county.

The county comprises 496 square miles, or 317,440 acres. The elevation of the northern two-thirds of the county is between 650 and 900 feet above sea level, and the elevation of the southern or hill section varies from 1,100 to 1,400 feet.

The topography of the county varies from undulating to rolling, with some small steep or broken areas. The larger part of the area is favorable in topographic features for farming.

Drainage for the most part is good, though there are several large areas, as well as many smaller ones, that are badly in need of more thorough drainage.

The total population of the county in 1920 was 37,976, of which 53.3 per cent was classed as rural. The rural population is gradually decreasing. Batavia is the county seat and largest town.

The county is well supplied with transportation facilities, which bring it within reach of many of the larger markets.

The mean annual temperature of the county is 45.6° F. The maximum temperature recorded is 100° and the minimum —21°. The winter season is long and rather severe, and snow remains on the ground during most of the winter months. The mean annual precipitation is 36.87 inches, and it is well distributed throughout the year. Rainfall during the summer is sufficient for crops. The average frost-free or growing season is 150 days.

Agriculture is the main industry of Genesee County. Wheat, oats, barley, corn, potatoes, rye, cabbage, beans, and truck crops, with some orchard fruits, are the principal crops. General farming is practiced in conjunction with dairying.

Crop rotation is practiced by the better farmers. Commercial fertilizers are used on cultivated crops. Agricultural lime is used by some of the leading farmers.

According to the 1920 census report 71.1 per cent of the farms were operated by owners. The average size of the farms was 95.9 acres, of which approximately 76 acres were classed as improved land. The general appearance of the farm buildings and equipment is good. The current value of farm lands ranges from $40 to $150 an acre, the value of the better land ranging from $100 to $150 an acre. Developed muck land sells at $300 to $500 an acre.

The soils of the county are variable with respect to color and the nature of the material from which they have developed. They may be divided broadly into two main groups, those which have calcareous subsoils and those which have noncalcareous subsoils. The calcareous

soils constitute some of the best farming lands of the county, they being confined largely to the northern part. The noncalcareous soils are mainly in the southern or hill section of the area. Some of the subsoils consist of loose and friable materials, whereas other subsoil materials are decidedly compact and heavy. Some of the soils are well or excessively drained, most of them being well drained, and others are deficient in drainage, owing to compact and impervious subsoils. Some of the soils have very poor drainage. Most of the soils are fairly well supplied with organic matter, though a considerable number of them would be materially improved by applications of manure and the turning under of cover crops.

Thirty-eight types of soils, including 4 phases, are mapped in Genesee County, representing 24 series. In addition, other lands have been classed as muck and as rough broken land. All of the county had been subjected to glaciation at a very early time, so that the parent materials giving rise to the Genesee County soils represent a veneer of glacial debris which had been deposited over the country rock. In the northern two-thirds of the county the till is rather deep, originating largely from limestone, and some from shale and crystalline rocks. In the southern or hill section of the county the till had been deposited as a rather thin layer over shale rock. Here the material composing the lower portion of the subsoils is largely residual, originating from the underlying shale.

The soils of the northern part of the county, which are derived from limestone materials, have calcareous subsoils. These soils are brown to dark brown in color, whereas the noncalcareous soils are light brown, grayish brown, or brownish gray.

The soils of Genesee County are classed into the following 10 major groups:

Soils developed from calcareous materials, which contain considerable silt and clay, including the Honeoye, Ontario, Darien, Lyons, Cazenovia, and Superior soils.

Soils derived from thin calcareous glacial till and residual materials, including the Mohawk and Farmington soils.

Soils derived from thin glacial till and residual materials, which are largely noncalcareous, including the Mahoning, Canfield, Allis, Lordstown, and Trumbull soils.

Soils derived from calcareous sandy or gravelly materials, including the Palmyra and Groton series of soils.

Soils underlain by calcareous materials, mainly silty or clayey, including the soils of the Dunkirk, Schoharie, and Poygan series.

Soils underlain by noncalcareous silty or clayey materials, including those of the Fulton, Granby, and Tyler series.

Alluvial soils which are slightly calcareous, including the Genesee soils or first-bottom lands which occur along streams.

Alluvial soils which are not calcareous, including those of the Tonawanda and Holly series.

Soils derived from accumulations of organic matter, including the muck soils.

Miscellaneous soils, including the rough broken lands.

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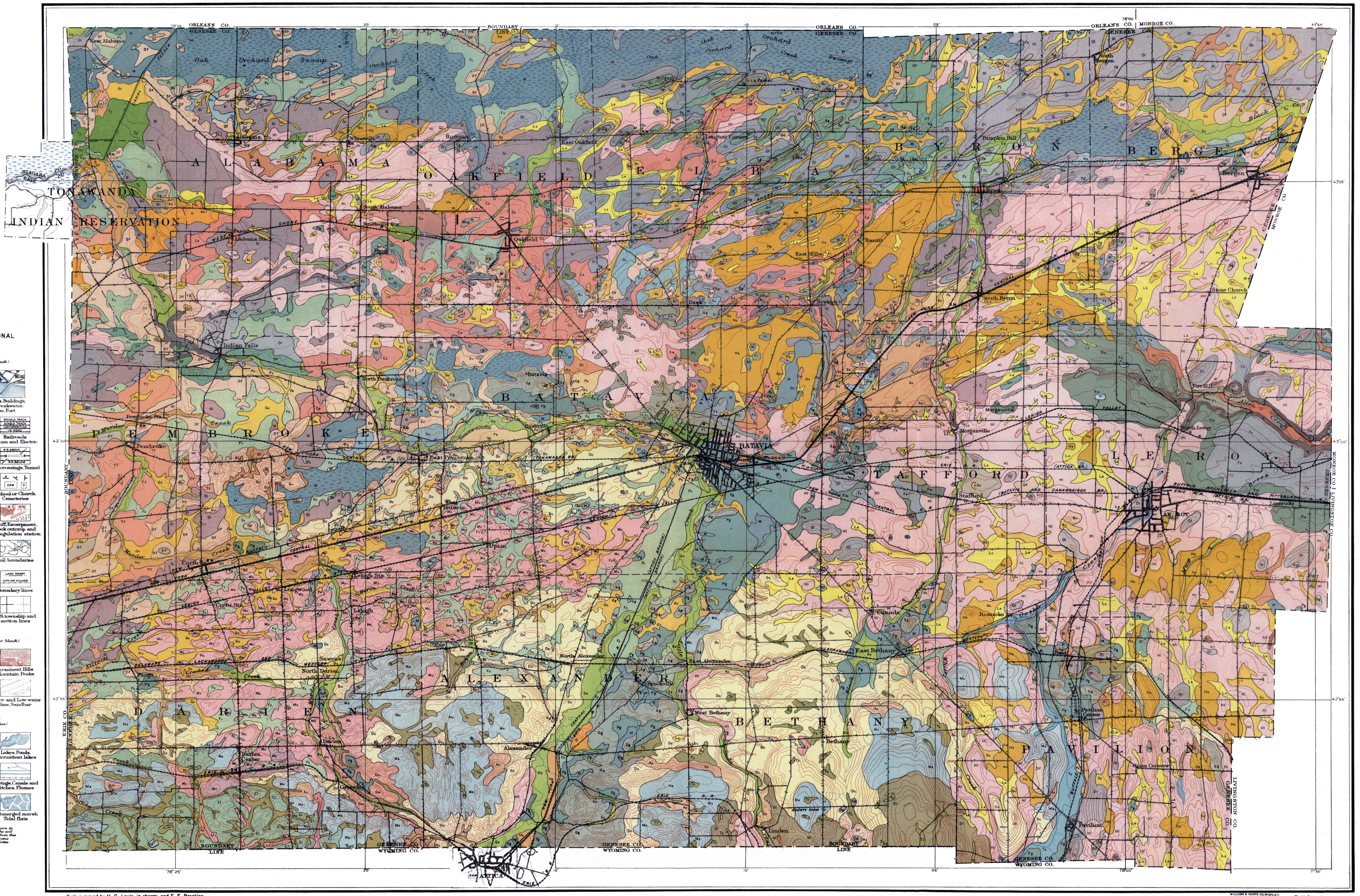
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS
IN COOPERATION WITH THE
NEW YORK STATE COLLEGE OF AGRICULTURE
CORNELL UNIVERSITY

SOIL MAP

NEW YORK
GENESEE COUNTY SHEET



CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
Secondary roads and Trails
Railroads Steam and Electric
Bridges, Ferry
R.R. crossings, Tunnel
Ford, Dam
School or Church Cemeteries
Mine or Quarry Mine dumps Made land
Bluff, Escarpment, Rock outcrop and Triangulation station
Stony and Gravelly areas
Soil boundaries
Boundary lines
Boundary lines
Boundary lines
U.S. township and section lines

RELIEF
(Printed in brown or black)

Contours Depression contours
Prominent Hills Mountain Peaks
Sand, Wash, and Sand dunes
Shore and Low water line, Sandbar

DRAINAGE
(Printed in blue)

Streams
Lakes, Ponds, Intermittent lakes
Intermittent streams
Springs, Canals and Ditches, Flumes
Swamp Salt marshes
Submerged marsh Tidal flats

LEGEND

Allis silty clay loam (Ac)	Holly silty clay loam (Ho)
Canfield shaly silt loam (Cl)	Honeoye loam (Hl)
Cazenovia silt loam (Cs)	Honeoye silt loam (Hs)
Cs Shallow phase	Lordstown shale loam (Ll)
Darien loam (Dl)	Lyons silt loam (Ls)
Darien silty clay loam (Dc)	Mahoning silt loam (Ms)
Dunkirk fine sandy loam (Df)	Mohawk silty clay loam (Mc)
Df Sandy phase	Mc Shaly phase
Dunkirk silt loam (D)	Ontario fine sandy loam (Of)
Farmington stony loam (Fs)	Ontario loam (Ol)
Farmington cherty loam (Fh)	Palmyra gravelly loam (Pg)
Farmington loam (Fl)	Palmyra sandy loam (Ps)
Farmington stony silt loam (Fm)	Poygan silty clay loam (Pc)
Fulton silty clay loam (Fc)	Schoharie silt loam (Ss)
Genesee fine sandy loam (Gf)	Ss Heavy phase
Genesee silt loam (Gs)	Superior very fine sandy loam (Sv)
Granby loam (Gl)	Superior silt loam (Sl)
Granby silty clay loam (Gc)	Tonawanda silt loam (Ts)
Groton gravelly loam (Gg)	Trumbull silty clay loam (Tc)
Groton gravelly clay loam (Gm)	Tyler fine sandy loam (Tf)
Groton very fine sandy loam (Gv)	Tyler silt loam (Ty)
Muck (M)	Rough broken land (R)

Soils surveyed by H. G. Lewis, in charge, and E. F. Brookins of the U. S. Department of Agriculture and F. B. Howe and D. F. Kinsman of the New York State College of Agriculture.

BASE MAP FROM
U. S. GEOLOGICAL SURVEY SHEETS

Scale 1/62500

Contour interval 20 feet.
Datum is mean sea level.

WILLIAMS & HEINTZ CO., WASH., D.C.

Field Operations
Bureau of Soils
1922